A GUIDE TO THE COLLECTION AND SUBMISSION OF SAMPLES FOR LABORATORY ANALYSIS

SEVENTH EDITION

Coordinated by

Customer Services Unit
Laboratory Services Branch
Ontario Ministry of Environment and Energy

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Editor

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Purpose and Scope of this Guide

This Guide has been prepared for customers of the Ontario Ministry of Environment and Energy Laboratories. The Guide provides information and direction for: the selection of sample containers and sample preservation; submission protocols; the required volume or weight of sample; and how to ship samples to the laboratory. Other topics such as: sampling program plan design, selection of sampling equipment and detailed field procedures are included only as they relate to specific Ministry programs, the validity of analytical measurements, the potential to introduce contamination, sample/analyte stability, or efficient customer service.

While this Guide is primarily intended for use by customers of the Ministry laboratories, it may be of assistance to other people involved with environmental sampling. In this case, any specific directions provided here should first be confirmed with the participating laboratory staff.

Any comments or suggestions for additions or revisions to this Guide are welcome. Please contact our Customer Service group as identified in Appendix 1.

THE LABORATORY CUSTOMER RESPONSIBLE FOR PROGRAM AND SAMPLE PLANNING OR TAKING ENVIRONMENTAL SAMPLES, PLAYS A FUNDAMENTAL ROLE IN ENSURING THAT THE LABORATORY DELIVERS HIGH QUALITY INFORMATION IN A TIMELY FASHION.

An Introduction to The Ministry Laboratories

The Ontario Ministry of Environment and Energy serves the province through six regions with boundaries as given below.

MOEE REGIONS AND REGIONAL OFFICES

REGION	REGIONAL OFFICE
Central	Toronto
Mid-Ontario	Sudbury
Northern	Thunder Bay
Southeastern	Kingston
Southwestern	London
West Central	Hamilton

CENTRAL	-	Toronto East/West, York Durham, Halton-Peel
MID-ONTARIO	-	Sudbury, North Bay, Gravenhurst, Barrie
NORTHERN	-	Thunder Bay, Timmins, Kenora, S.S. Marie
SOUTHEASTERN	-	Kingston, Peterborough, Belleville, Ottawa
SOUTHWESTERN	-	London, Owen Sound, Sarnia, Windsor
WEST CENTRAL	-	Hamilton, Cambridge, Welland

Three regions, the Northern, Southwestern, and Southeastern, have laboratories located at Thunder Bay, London and Kingston, respectively. Samples collected within these regions are analyzed by the regional laboratory when the requested testing capability is available. In all other cases, samples are analyzed at the Laboratory Services Branch in Toronto. The four laboratories of the Ministry provide analysis for a large number of chemical and microbiological tests. Testing is available for: domestic water supplies, surface waters, ground waters and domestic and industrial wastes. Fish, vegetation, soil, air, dry and wet precipitation and snow samples are also tested. The chemical tests that can be performed by each Laboratory are outlined in Tables 1 to 4 at the back of this Guide.

Mobile laboratories and field stations are also available and provide a range of tests in response to emergencies, remote surveys or special studies.

TO AVOID UNNECESSARY DELAYS AND COSTS, CONFIRM THAT THE LABORATORY IS CAPABLE OF ANALYZING THE TEST(S) REQUIRED, BEFORE SHIPPING SAMPLES.

Customers of the Thunder Bay laboratory are encouraged to contact that laboratory for a copy of their Laboratory User's Manual (See Appendix 1).

A. Sample Acceptance Policy

The Ministry laboratories analyze samples for the Ministry's environmental programs. These programs include: surface and ground water quality monitoring; industrial waste and wastewater assessment; air quality monitoring; solid and liquid waste management; biological monitoring (including fish, aquatic and terrestrial vegetation); municipal drinking water

assessment and wastewater treatment; and enforcement and litigation. Samples are collected by Ministry staff and authorized federal, provincial or municipal government employees. Samples are accepted from other programs or for other purposes only under formalized agreements established with the laboratory.

All samples destined for Ministry laboratories must be collected and submitted according to the protocols described in this Guide.

The Ministry laboratories do not accept samples directly from the public. If you require additional information or assistance in this regard, please contact the laboratory nearest to you (Appendix 1).

B. Interlaboratory Split Sample Policy

The Ministry laboratories participate in the exchange and testing of interlaboratory split samples as a part of their quality management programs. The laboratories also provide expert interpretation of interlaboratory study data.

To ensure that these special samples are properly tracked and reported, they must be approved by laboratory staff prior to submission. The Director, Laboratory Services Branch, reserves the right to refuse interlaboratory split samples if there are questions regarding the proper splitting or handling of samples, or other factors which may influence the proper interpretation of the reported results.

C. Recommendations for a Sampling Plan

The success of an environmental testing program depends to a large degree on the application of a well-defined sampling plan. The complexity of a sampling plan depends on the type of program it serves. For example, a sampling plan can serve an emergency or complaint, routine monitoring or an experimental program. Emergency or complaint programs are usually "one-time" events, whereas, monitoring and experimental programs can be long term activities. Regardless of the type of program, a number of common questions help to finalize the sampling plan.

One critical question, especially for the laboratory, is "How many samples are necessary to achieve the program goals?". Consideration should be given to field costs, laboratory capacity, expected turnaround times and analytical costs. Some organic tests can exceed $1,000 per sample - excluding the actual sampling and transportation costs! A large influx of samples can overwhelm short term laboratory capacity, resulting in large delays in reporting.

IF YOU ARE PLANNING A LARGE OR COMPLEX SAMPLING PROGRAM, IT IS ESSENTIAL THAT YOU MAKE CONTACT WITH THE LABORATORY DURING THE PLANNING STAGES.

A second question to consider: "Are there any regulatory requirements (ie site, frequency of sampling, type of sample, etc.)"? The information provided in this Guide will address most Ministry program goals. However, care must be taken to adhere to regulatory requirements if the sampling information is different.

A third question to consider: "Are there any chances of contamination of the samples?" Contamination can occur during sampling, sample handling, transportation or laboratory analysis. Contamination inevitably leads to unusable laboratory results, wasted time and money. One way of identifying and then correcting a contamination problem is to use ***blanks***. If no contamination is found, it is not significant in the chosen analytical range. If contamination is significant, then the source must be identified and eliminated. The check for contamination should be repeated periodically, especially when the sampling or analytical technique is changed or if small concentrations are involved.

Using a water sampling program as an example, the following options are available. A ***Field blank*** is a sample of deionized distilled water used to rinse sampling devices and verify the cleanliness of the devices and associated field handling protocols. A ***travelling spiked blank*** is a laboratory-prepared sample containing a known amount of the substance of interest which travels to the sampling location and back to the lab unopened. This sample monitors both laboratory contamination and the stability of the spiked analyte under field conditions. A ***travelling blank*** is a sample of deionized distilled water prepared by the laboratory for transportation to the field site. It monitors and identifies contamination as a result of containers, preservatives or the laboratory activity. Variations of these options are available for most sample matrices.

Other planning questions include: "What is the appropriate number and type of containers?" and "Are there any special preservative, storage, and shipping requirements?" Guidance in this area is provided in Tables 1 to 4 at the back of this Guide. In general, the aim is to collect a representative sample from a known location and transfer that sample to the laboratory in a manner that will minimize changes in chemical or biological composition.

Program planners and field samplers are asked to check with the laboratory for details on: availability of requested testing, low level concentrations and analytical ranges, parameters detected by the test method, possible interferences (matrix effects) and analytical quality assurance statements.

Finally, for complex samples (e.g. mixtures, complex sampling protocols, multiple layers) or unusual test requests, please consult the laboratory staff as early as possible. In many cases, a brief conversation will ensure a clear understanding of what analyses can and should be performed along with any required or recommended modifications to the sampling and submission protocol.

Ministry laboratories track and report sample workloads and results through a Laboratory Information System (LIS). In order to provide the best information to our customers regarding sample status in the laboratory, all samples are submitted to the laboratory with accurately completed LIS forms. Section 4 (Sample Submission) provides guidance in the proper completion of these forms that will help to eliminate delays in sample processing and data reporting. The careful selection of test codes also accelerates reporting by eliminating unnecessary testing. A final, careful cross-check of the sample(s), sample label(s), LIS submission forms and test request(s) can save you and the laboratory a lot of time.

Please call If you have any concerns, questions or information to share with the laboratory staff regarding your samples or sampling plans. Appendix 1 provides a list of key contacts to serve your needs.

Safety Considerations

A. Introduction to the Occupational Health and Safety Act

No sample is worth collecting at the price of life or limb, thus, whenever a sample is collected, consider your health and safety. The Occupational Health and Safety Act and its regulations include a number of sections that specifically apply to activities and situations involving sampling. The following are highlights of those sections.

THE INFORMATION PROVIDED IN THIS SECTION IS FOR GENERAL GUIDANCE ONLY. SPECIFIC, LEGAL REQUIREMENTS AND RESPONSIBILITIES OF EMPLOYERS, SUPERVISORS AND EMPLOYEES ARE CONTAINED IN THE LEGISLATION [22]

SECTION 16

1. A supervisor shall ensure that a worker,

   a) works in the manner and with the protective devices, measures, and procedures required by this Act and the regulations; and,

   b) uses or wears the equipment, protective devices or clothing that his employer requires to be used or worn.

2. Without limiting the duty imposed by subsection 1, a supervisor shall,

   a) advise a worker of the existence of any potential or actual danger to the health or safety of the worker of which the supervisor is aware;

   b) where so prescribed, provide a worker with written instructions as to the measures and procedures to be taken for protection of the worker; and

   c) take every precaution reasonable in the circumstances for the protection of a worker.

SECTION 17

1. A worker shall,

   a) work in compliance with the provisions of this Act and the regulations;

   b) use or wear the equipment, protective devices or clothing that his employer requires to be used or worn;

   c) report to his employer or supervisor the absence of or defect in any equipment or protective device of which he is aware and which may endanger himself or another worker;

   d) report to his employer or supervisor any contravention of this Act or the regulations or the existence of any hazard of which he knows; and

   e) where so prescribed, have, at the expense of the employer, such medical examinations, tests or x-

rays, at such time or times and at such place or places prescribed.

2. No worker shall,

   a) remove or make ineffective any protective device required by the regulations or by his employer, without providing an adequate temporary protective device and when the need for removing or making ineffective the protective device has ceased, the protective device shall be replaced immediately;

   b) use or operate any equipment, machine, device or thing of work in a manner that may endanger himself or any other worker; or

   c) engage in any prank, contest, feat of strength, unnecessary running or rough and boisterous conduct. 1978, c. 83, s. 17.

B. Recommendations for Field Practices

1. All persons carrying out sampling activities must be familiar with the applicable sections of the Occupational Health and Safety Act and regulations for industrial establishments, in particular, those sections dealing with safeguards, confined spaces and personal protective equipment.

2. All staff carrying out sampling activities at an industrial establishment or pollution control plant must become familiar with the property, process, operation and associated hazards or be accompanied by plant personnel or another person who is aware of any potential hazards.

3. When sampling at sewer access hatches on streets or roadways where vehicle or pedestrian traffic may endanger the safety of any sampler, safeguards such as barriers, warning signs, traffic cones, vehicles equipped with flashing lights, fluorescent clothing, flag operators or other safeguards deemed appropriate for the circumstances shall be used for the protection of all workers in the area. The sampler must be trained in confined space entry.

4. Safety footwear shall be worn when removing sewer access hatch covers or when working in any area where a worker may be exposed to the hazard of foot injury.

5. When sampling potentially hazardous materials such as sewage, industrial waste, or contaminated soils, the sampler shall wear the appropriate protective equipment, i.e. rubber gloves and boots, face and respiratory protection, as required. The re-entry period for pesticides shall be observed for areas which have been treated. Personnel shall observe the normal rules of basic hygiene, (i.e. wash hands and face, etc.) after sampling. Contaminated equipment and clothing shall be cleaned after each use.

6. There should be a minimum of two people present when sampling is potentially hazardous such as on slippery, steep or icy creek and river banks, at street sewer access hatches, from any water craft or along any waterway during hours of darkness. Work in confined spaces, such as down a sewer access hatch or wet well, requires additional precautions and equipment: gas detectors, safety harness, blower for purging, breathing apparatus etc.

7. Potentially hazardous materials, (i.e. chemicals, contaminated samples) shall be protected against accidental

breakage and spilling during transport. Sample bottles containing materials which may generate gases, (i.e. sludge), must not be more than half full to allow room for expansion. Potentially dangerous samples should be clearly labelled and marked "hazardous" (i.e. flammable, corrosive, toxic, explosive or radioactive) for the benefit of all persons who must subsequently handle the samples. Suitable labels are obtainable from Laboratory Services Branch (Central Stores).

8. Caution should be observed in handling sampling boxes and chemicals such as preservatives. Rough handling which may cause undue agitation to samples and other containers should be avoided. Proper safe lifting techniques should be employed.

9. Samples received at the Laboratory Services Branch **must be** in unbroken containers (no leakage). Samples in damaged condition will not be accepted.

10. The sampler must label sample containers, boxes etc. in accordance with the Workplace Hazardous Materials Information System (WHMIS) of the Ontario Health and Safety Act (OHSA). Failure to do so may result in the return of the sample.

C. Workplace Hazardous Material Information System (WHMIS)

According to the Ontario Health and Safety Act, Section 22(b) 1(a), ***"an employer must ensure that every container present in the workplace that contains hazardous material is and remains labelled in the prescribed manner."***

Consequently, if the contents of any sample are suspected to be hazardous, the container label must provide the following information:

a) product identifier (ingredients, if known)
b) handling instructions
c) hazardous warning notice
d) hazard information or source where such information can be obtained.

This applies, not only to the supplies and containers used to take samples, but also to the samples taken for submission to the laboratory.

SAMPLES KNOWN OR SUSPECTED TO CONTAIN HAZARDOUS SUBSTANCES, MUST BE CLEARLY LABELLED AND IDENTIFIED PRIOR TO SHIPMENT TO THE LABORATORY.

Sample Collection

A. Water Quality Assessment

A.1 Chemical Analysis

General Considerations

Before an environmental sample is taken, consider the following questions and issues:

i) Is the sample truly representative of the location and environment being investigated?

ii) Have all possible sources of sample contamination been eliminated or reduced to an absolute minimum (e.g. sampling devices, motor exhausts, disturbance of bottom sediments, use of inappropriate containers, etc.)?

iii) Have arrangements been made for the rapid transportation of the samples to the laboratory? Sample composition will change with time. Fast transportation to the laboratory is desirable. For some tests, it is essential.

iv) For samples which do not have a preservative already in the collection bottle, rinsing both the bottle and cap with the sample (two or three times) is generally recommended. This procedure reduces contamination that may be present, and tends to equilibrate the sample with the container walls and, minimizing "container effects" (leaching, adsorption, etc.).

Sampling for organics is an exception since repeated rinsing may actually concentrate the compounds on the walls of the container leading to higher results. If you have questions about this, please contact the staff of the Organic group involved (Appendix 1).

Sample Containers

Tables 1 to 4 at the back of this Guide summarize the proper sample container for each test and Table 5 lists the containers available from the Central Stores at Laboratory Services Branch. Special studies or samples may require a unique container type or sampling method. For example:

Sludge samples are collected in wide mouth glass or plastic bottles and never filled more than half way. The extra space is required as an expansion zone for gaseous products that may be formed. Failure to submit samples in this manner may result in container explosion during transit or at the laboratory. Overfilled sludge samples are discarded ***without*** analysis. The same sludge samples for ***trace organic contaminant analysis*** are collected in a wide mouth glass container with a teflon-lined or foil-lined cap.

For ***trace level metal analysis*** of surface and domestic waters, PET 500 (500 ml polyethyleneterephthalate) containers are used.

Samples submitted for ***microbiological analysis*** require a special sterile container, pre-charged with preservative and are generally unsuitable for chemical analysis. An appropriate, separate bottle is submitted for each of these test types.

These are just a few examples of the special container requirements for samples. If you are unsure of any of these requirements, or the Tables do not cover your needs, laboratory staff can provide additional assistance.

Preservation Techniques

The function of a preservative is to stabilize an analyte of interest and minimize changes in composition during transportation and the time prior to analysis.

Preservation usually involves the addition of a chemical which ***"ties-up"*** the analyte in a stable form, unaffected by the sample. In other cases a preservative creates conditions in the sample which minimizes or stops any further degradation. Reduced temperature can be a useful preservation technique, alone, or in combination with a chemical preservative. Refrigeration or freezing to reduce chemical and microbial reaction rates effectively preserves biological samples and analytes (***e.g. freezing of fish tissues for organics and heavy metals***).

Preservation for some analytes is effective. For others, it serves only as a technique to marginally reduce the decay of the sample or the rate of loss of the analyte. Some samples cannot be stabilized. For example, conventional tests such as ***BOD, COD, solids, nitrogen or phosphorus*** compounds in biologically active raw or treated wastes; ***dissolved ions/metals such as hardness, calcium, alkalinity, conductivity, iron*** in groundwater samples; or ***volatile organics*** in soils can and do change dramatically within the first few hours after sampling. In these cases the only solution is for the fastest possible sampling, transportation and analysis of the samples. But, it is important to remember that while you and the labora-

tory make every effort to initiate analysis for these samples as soon as possible, ***the result reported by the laboratory reflects the presence and concentration of a analyte at the time the analysis is done.***

Perishable sample and analyte combinations sometimes reveal themselves in the laboratory through inconsistent relationships among the analytical results (ion balance), by precipitation on container walls, etc. In some cases, laboratory staff can provide advice on the availability of alternate or non-routine sampling procedures, precautions and preservation techniques, if such are available.

It is important to understand that the use of the recommended preservative for one analyte may negate the possible analysis of another. For example, samples preserved with ***nitric acid*** for ***heavy metals*** are unsuitable for ***nutrient*** analyses. To determine whether use of a certain preservative will affect the analysis of another requested analyte, refer to Tables 1-4 and provide replicate samples preserved as appropriate. Each replicate should have the ***preservation technique clearly marked*** on the bottle label. If you have any questions, contact the laboratory staff (Appendix 1).

Sample Volume

Each analytical method requires a certain minimum volume or weight of sample. Tables 1 to 4 identifies this requirement. Submitting at least 20% excess will allow for possible repeat analysis. ***For court case samples, provide enough samples to permit duplicate analysis.***

THE VOLUME REQUIREMENTS FOR THE FULL RANGE OF MAJOR IONS AND NUTRIENTS (500 ml) IS LESS THAN THE SUM OF INDIVIDUAL VOLUMES FOR EACH ANALYTE LISTED IN TABLES 1 TO 4. SINCE CERTAIN ANALYTE COMBINATIONS ARE PROCESSED AND/OR ANALYZED SIMULTANEOUSLY, THE OVERALL VOLUME REQUIRED IS REDUCED.

In special cases, domestic drinking waters or surface waters may require a larger amount of sample in order to provide sufficient quantity of the analyte for reliable detection. Samples of high concentration (effluent, sewage, etc.) require a much smaller amount, and a dilution may even be employed. If samples contain relatively high concentration of noxious, toxic and hazardous materials, then a relatively smaller volume of sample needs to be submitted. This will reduce the impact of accidental spills and final disposal.

THE SUBMISSION OF EXCESSIVE QUANTITIES OF NOXIOUS, TOXIC OR HAZARDOUS WASTES CREATES SERIOUS SAFETY AND DISPOSAL PROBLEMS AT THE LABORATORY. IF IN DOUBT, CONTACT LABORATORY STAFF. (ALSO, SEE SECTION 2 - SAFETY CONSIDERATIONS).

In certain cases obtaining sufficient sample volume, weight or duplicates is impossible. In these cases, analysis may still be done if special care and analytical techniques are used in the laboratory. This can only be achieved before sample submission and after consultation with the appropriate laboratory staff.

INSUFFICIENT SAMPLE VOLUME OR WEIGHT WILL NORMALLY RESULT IN AN "INSUFFICIENT SAMPLE" REMARK REPORTED ON THE ANALYSIS REPORT FOR ONE OR MORE ANALYTES.

Sampling Methodology

The methods used to obtain a sample vary according to location, time of year, physical distance from the sampling point, the equipment available, and the sampler's expertise and knowledge. The number of documented sampling methods fill many volumes in environmental reports, journals and handbooks. This Guide does not provide details for all water sampling methods. The Ministry has published a comprehensive document for the Municipal Industrial Strategy for Abatement (MISA) program.[14] That protocol, while required for MISA samples, offers guidance and direction that may be appropriate for other water sampling programs. It covers the topics of: sampling equipment (automated and manual); sample types (grab, composite); sampling techniques; regulatory preservation and storage requirements and additional, special tips, precautions and considerations to increase the efficiency of sampling and decrease the likelihood of mistakes.[14]

Field Records

It is essential to keep complete records of every sample collection activity. Information such as: sample number, location, description, and submission number is important. Observations such as unusual circumstances, weather or sampling site features may be extremely useful in interpreting the analytical data. Field records are invaluable in the

event of sample loss or misnumbering of sample bottles, laboratory submission forms and reports.

A.2 Microbiological Testing

General Considerations

Aseptic techniques must be followed when handling the sterile bottles used for microbiological sample collection. Failure to do so will contaminate samples, compromising analytical results. It is recommended that the techniques described below be closely followed in order to obtain reliable data.

Touch only the outer surface of the cap when opening the bottle. The inner lip of the bottle and cap liner must not come in contact with anything except the atmosphere and the water being sampled. If they are accidentally touched, the sample container must be considered contaminated and should not be used. Hold the cap in your fingertips until the sample has been taken. The cap must ***not*** be set down somewhere while the sample is being taken as this may result in contamination.

Table 4 lists the microbiological tests performed in each Ministry laboratory. If the pollution sources are complex or there is doubt as to the most appropriate selection of ***bacterial tests***, contact the Microbiology staff.

Sample Containers

The sterile 300 ml bottles with red labels available from the laboratories, provide adequate volume (200 Ml) for routine

analyses. The plastic seal on each container must be intact before sampling. Containers with loose or cracked seals should not be used.

Ship microbiological samples in a separate container, preferably the cardboard box within which the containers are provided. Where this is not possible, clearly mark the outside of the shipping container to alert sample reception staff to its contents.

Microbiological samples should be accompanied by their own, separate set of laboratory submission forms to expedite transfer and testing within the laboratory.

Preservation Techniques

Sodium thiosulphate is used to neutralize the disinfecting properties of chlorine, preserving the microbial population at the time of sampling. Waters in which a chlorine residual is suspected must be preserved with sodium thiosulphate.This preservative is already present in the red-labelled sample bottles.

During spring, summer and fall, pack samples in ice or with ice packs to minimize biological activity. In winter, pack samples in insulating material while still keeping them cold. ***Samples must not be frozen***, and should be protected from direct light during transportation to the laboratory. All samples should be collected early in the week and shipped immediately to the appropriate laboratory.

For special studies such as sulphur-cycle bacterial analyses, contact the Microbiology staff to determine whether thiosulphate should be used.

Sample Volume

In general, one bottle per sample provides sufficient volume for standard analyses. If, however, the bacterial levels are expected to be very low or extra tests are being requested, additional samples may be required. Consult with Microbiology staff in such cases.

Sampling Methodology

Adherence to the following sampling procedures is recommended:

i) Surface Water Samples

Surface sampling from a river or stream is accomplished by quickly lowering the sample bottle into the water approximately one meter below the surface with the mouth facing into the current. It is important to keep the mouth of the bottle higher than the base to avoid loss of the pre-charged preservative. When sampling near shore, care should be taken to get a sample uncontaminated with sediment. When bubbles are no longer observed coming from the bottle, the bottle is then removed from the water, the water level adjusted to the top of the label, and the bottle is immediately recapped before un-clamping it from the sampling pole. The use of a dipper, a sampler with a side-holder for other bottles, or any other sampling device may result in contamination.

ii) Tap Water Samples

Samples from taps must be taken only after aerators, screens, hoses, etc., have been removed. Prior to sampling from a tap, the water should be allowed to run at full flow for approximately two minutes. The strong flow will clean out residual contamination around the orifice of the tap thus ensuring a more representative sample. The water pressure should then be reduced to permit taking the sample without excessive splashing which could result in contamination of the sample or loss of preservative.

Fill the bottle to the top of the label being certain that the mouth of the bottle does not come in contact with tap or any contaminated surface. The cap must also be handled aseptically as described previously.

A.3 Asbestiform Mineral Fibres

Asbestos determination involves a time-consuming electron microscopic inspection. The extreme care and time required for this analysis make the test very costly. Consult with the Electron Microscopy staff prior to submitting samples.

Collect water samples in a 1L polyethylene bottle (PET 500 plastic bottles may be used in an emergency). New bottles **only** should be used. The usual precautions of multiple bottle rinsing, rapid transport to the laboratory, etc., are of particular importance for the collection of asbestiform mineral fibre samples. Send samples to the Microscopy and Special Projects Unit, Laboratory Services Branch.

A.4 Snow-Cover

General Considerations

A snow sampling survey should be designed to provide an adequate number of sample points to cover the area of interest.

Sample sites should be in undisturbed locations, away from roads or other local sources of contamination, sufficiently open to permit the free fall of snow but not exposed to excessive drifting. Two control samples, remote from any known source of contamination are recommended for each investigation.

To avoid contamination from dead vegetation or other matter near the ground, snow sampling is done only when the total depth of snow exceeds 25 cm. The quantity of snow required for analysis will depend upon the types of tests requested. Generally, sufficient snow to yield 2 L of meltwater is adequate.

Sampling Methodology

Collect samples with an acrylic cylinder (15 cm inside diameter) which has been shown to be contamination-free for the analytes of interest. The cylinder should be of sufficient length to accommodate the expected total depth of snow. Insert the cylinder into the snow to the required depth, clean the snow from around one side of the cylinder and raise the cylinder about 5 to 10 cm off the ground. Insert a hard, clean plastic plate under the base of the cylinder and remove cylinder and contents. Transfer the collected snow into clean heavy-gauge polyethylene bags and retain in unmelted condition until ready for processing.

Record the number of cores obtained at each site, total depth of snow, surface area sampled, the kind and amount of visible surface and subsurface contaminants. Duplicate samples may be collected at each site to avoid data loss and to assist in interpreting any anomalous results.

Sample Processing

Snow samples in bags tend to become icy and hard and the bags are easily punctured when contacted by any hard surface. Therefore, transfer the sample to a second clean polyethylene bag placed in a plastic pail. Melting typically takes 12 - 18 hours. Measure the volume of meltwater by weighing the sample in the plastic bag (allowing, for the tare weight of the bag). Mix vigorously, to ensure uniform distribution of particulate matter, and pour appropriate aliquot into sample containers, appropriate to the type of analysis and preservation treatment as indicated in Tables 1-4.

A.5 Ground-Water

General Considerations

i) The selection of a sampling procedure is preceded by specifying the objectives of the study and the factors which influence ground-water quality.

ii) Laboratory analysis requests must represent the minimum number of analytes to achieve the objectives of the study.

iii) Appropriate steps are taken to obtain representative samples of ground-water.

iv) Tests such as temperature, Ph, alkalinity, conductivity and dissolved gases, should be carried out in the field due to sample changes that occur before analysis at the laboratory.

v) For each sampling point, maintain a record of sampling conditions. For example, a description of well location, depth, construction, static level, number of well volumes evacuated, details of sampling method, equipment used and any other relevant points.

Sampling Methodology

Most of the comments in Subsection A.1 regarding sample collection for chemical analysis are applicable to ground-water samples. The procedure for sample collection and treatment for specific analyses follow.

i) Major Inorganic and Trace Element Ions

Some studies may require the samples to be filtered in the field. For ***inorganic analytes***, it is desirable to filter through a 0.45 μm membrane filter before preservation and/or analysis to exclude any undissolved (suspended) material present at the sample source.

If field filtration is not possible, decant the sample from any particulate material, refrigerate and filter sample within 24 hours. Following filtration, samples to be analyzed for major ***inorganic anions*** are preserved by refrigeration. Samples for trace metals are placed in PET 500 containers, and preserved with HNO_3.

The filtration of clean ground-water samples may not be necessary. However, these samples should be preserved as above.

ii) Organic Analytes

Do ***not*** filter samples to be analyzed for ***organic analytes***. In some cases, the analytes attach themselves to the particulate matter. In this case, the entire sample is submitted to the laboratory for assessment.

iii) Dissolved Gases

Ground-waters may contain ***carbondioxide, oxygen, nitrogen, methane or hydrogen sulphide*** which are derived from chemical or biochemical processes and contamination.

If field analysis of the dissolved gases is impractical, special sampling and storage techniques are required. Samples should be collected in hard glass, chemically resistant bottles.

Fill the bottle to the top with no air space remaining beneath the cap. The bottled sample must be kept at a temperature between freezing and 4^0 C. Do not freeze.

To sample for gases released from ground water samples, displace water from an inverted calibrated glass tube submerged in a larger container receiving water from a pumped discharge line at a known flow rate. Seal the glass tube under water with a special

cap containing a septum, and preserve by refrigeration.

iv) Recommendation

The Regional Hydrogeologists can assist in designing the sampling program and suggest practical procedures for the collection of ground-water samples.

A.6 Field Analysis

The extreme perishability of some analytes necessitates field measurement.

In the case of major field studies, a field laboratory facility for this purpose may be required. For example, tests such as: ***temperature, dissolved oxygen, dissolved carbon dioxide, free chlorine, chloramine, and hydrogen sulphide*** are extremely perishable and on-site analysis by properly trained staff is recommended. Temperature and dissolved oxygen are conveniently measured using electrode sensors (and/or Winkler titration for dissolved oxygen) while dissolved carbon dioxide, free chlorine, chloramine, and hydrogen sulphide require more complex analytical techniques.

A.7 Trophic Status Analysis

For recreational use and aesthetic value, water clarity is one of the most important characteristics of a lake. ***Secchi disc visibility depth*** is one of the simplest and most

commonly made measurements of water quality. A Secchi disc is a circular steel plate 20 cm in diameter (8 inches) painted with opposing black and white quadrants. The depth at which it disappears from view when lowered vertically into the water is a relative measure of the water clarity of a lake.

Water clarity in most lakes is primarily affected by the amount of phytoplankton (microscopic algae which inhabit the water column). Individually these algae are invisible to the unaided eye, but collectively, increasing amounts of algae cause the water to become progressively more turbid and water clarity declines as a result. The depth to which there is sufficient light in a lake to allow algae to grow (called the euphotic zone) is approximated by twice the Secchi disc visibility depth. Under extreme conditions the lake may periodically take on a green, "pea-soup" appearance and Secchi disc visibility is reduced to only a few feet. The amount of algae in the lake may be simply determined by chemically measuring the concentration of chlorophyll in a sample of water. ***Chlorophyll*** is a pigment responsible for photosynthesis found in all green plants. Secchi disc readings and chlorophyll samples are taken preferably between 9:00 a.m. and 3:00 p.m. Readings should be done during sunny or light cloudy conditions. ***DO NOT*** take readings or collect samples during heavy overcast conditions. Samples are collected at a time to minimize sample transit time to the laboratory. Where possible, Sundays are preferred sampling days before Saturdays to allow for shortest possible delay in transportation to the laboratory and start of analysis.

Specific sampling protocols follow.

Secchi Disc

i) The preferred sampling location is in a deep, open-water area of the lake well removed from any localized shoreline influences.

ii) Take readings from a stationary, securely anchored boat. This is necessary so that the Secchi disc and sampling line descends vertically to ensure accurate depth measurements and composite sample collections.

iii) The water clarity measurement is made by lowering the Secchi disc into the water on the shaded side of the boat. The observer should notify other passengers of their activity and then, carefully, lean over the side of the boat to allow a view directly over the disc as it is lowered. Care should be taken to avoid being distracted by glare of reflected light from the water surface. When the disc just disappears, the depth is measured. The Secchi disc is then raised slowly until the black and white segments are just visible. A second reading is taken. The point halfway between these two readings is the Secchi disc visibility depth. Reading should be to the nearest 7 cm (3 inches).

For example:

- lowered until the disc just disappears = 3m
- raised until the black and white quadrants just reappear = 2m
- point halfway between (2.5m) is the Secchi disc depth.

Chlorophyll

i) After determining the Secchi disc depth, measure out twice this amount of rope and mark it with a clip or a knot. In the example described above, the length would be 5m. This depth is called the euphotic zone through which the water sample for chlorophyll is collected.

ii) Label the sample bottle with the lake name and the date of sampling.

iii) Secure the sample bottle in the sample bucket (e.g. by wedging the cap into the space between the bucket and the bottle).

iv) Lower the sampler as rapidly as possible down to the measured sampling depth and then retrieve at a constant speed. If the bottle is not full or almost full, discard the sample and adjust the speed of descent and retrieval such that the bottle is almost full (to the top of the label) when it reaches the surface. The object is to collect water uniformly from all parts of the measured sampling column.

In very shallow lakes where twice the Secchi disc visibility depth is deeper than the bottom, collect the water sample to within one metre of the bottom. Take care not to disturb the bottom sediment to ensure that the sample is not contaminated by sediment particles. If contamination is apparent or suspected, discard the sample, rinse the bottle and repeat the sample collection.

In the case of very transparent lakes (Secchi disc visibility greater than 4 metres) it may be very difficult

to raise and lower the composite sampler without the bottle filling before it returns to the surface. This problem may be overcome by utilizing the modified bottle cap enclosed with the sampling kit. The cap has been provided two 1/4" holes, each filled with a length of plastic tube. For proper functioning, the inlet tube should be well below the air outlet tube. This positioning prevents interference with the filling of the bottle by turbulence and bubbles by the escape of air from the bottle.

Preservation

The preservative for chlorophyll consists of a 0.5% (w/v) suspension of magnesium carbonate. Shake thoroughly each time prior to using. Add exactly 5 drops of this preservative solution to the chlorophyll water sample immediately after collection. Excess preservative interferes with subsequent testing.

Return the sample bottle to its container so as to exclude it from light and refrigerate or keep cool until delivery to the laboratory.

B. Air Quality and Phytotoxicological Assessment

General Considerations

The reliability of final results depends on the care and procedure used to collect samples. As with all other sample types, samples collected for air quality assessment must be representative of the whole and all possible sources of sample contamination must be either eliminated or minimized.

Containers

Routine, non-routine and specialized techniques, sampling equipment and containers are involved in sample collection so it is essential to consult laboratory staff prior to initiating a survey.

Preservation

Refer to the specific sampling technique below for information regarding preservation requirements and recommendations on transporting samples to the laboratory.

Field Records

Information provided should include sampling locations, air volumes sampled, weather conditions, frequency of sampling, analytical requirements, sampler's name and contact information. A written outline of the sample survey should also be provided.

B.1 Routine Techniques

Dustfall

A clean, sealed, polyethylene dustfall collection jar (30 cm tall x 15 cm diameter labelled with a unique station number) containing a polyethylene insert is attached to a suitable supporting bracket, uncovered, and allowed to collect settleable particulate matter over a one-month period.

Collectors are located in such a position as to provide dustfall samples that are representative of the area being studied.

After the collection period, the polyethylene insert is removed, heat sealed and transported to the laboratory in partitioned boxes or coolers at ambient temperatures.

It is very important that a record of station number and the dates of installation and removal accompany the sample since this information is necessary to calculate the results.

Hi-Vol Filter

The collection of suspended particulate matter involves the filtration of air through a pre-weighed 20 cm x 25 cm (8" x 10") glass fibre filter using a vacuum pump capable of drawing at least 1.3 m^3/minute. The normal sampling period is 24 hours. The pre-weighed and coded glass fibre filters and protective storage and transportation envelopes are available from the Inorganic Air Unit. Hi-Vol filters for the Northern Region are obtained from and sent to the Regional Laboratory in Thunder Bay.

A complete description of the Hi-Vol sampling device and procedure is available.[23]

Certain inorganic tests are incompatible with the glass fibre filters normally used. These include: ***Al, Ba, B, Ca, Na, K, Si and F***. For these elements, other filter types are recommended and are available from the Inorganic Air Unit, Laboratory Services Branch.

The filter must be carefully installed (rough side upwards) on the sampler, and the coded number recorded on the envelope. Ripped or punctured filters must be discarded. After carefully removing the filter, fold it in half along the 20 cm width, particulate side inwards and place in the corresponding envelope. Comments regarding unusual sampling conditions should be noted. This information may be important during data evaluation.

The filter envelope must bear the following information:

i) Station number (i.e. sampling location);

ii) Hi-Vol instrument number, date and time of exposure;

iii) Filter number;

iv) Operator name and contact information;

v) Flow readings at start-up and shut-down;

vi) Comments regarding incidents peculiar to the sampling period;

vii) Air volume (m^3)

The filter should be mailed to the Inorganic Air Unit along with the submission sheet listing the calculated air volume. There are no special preservation requirements.

Asbestiform Mineral Fibres

The analytical technique for the determination of ***asbestiform fibres*** in air involves a time-consuming electron microscopic examination of the processed samples.

The expertise, time and instrumentation required for this analysis makes the test very costly. For these reasons, sampler discretion regarding submission of samples is required.

Asbestiform minerals as suspended air particulates are collected on a 0.4 μm pore size Nucleopore filter using a modified Hi-Vol sampling device. The modification consists of installing a flange with a 2 cm diameter opening on the air exit of the sampling device.

This opening acts as a limiting orifice and brings the air flow rate into a suitable measurement range. It is recommended that the Hi-Vol sampling device be equipped with a transducer and an air flow rate recorder. The sampling device must be recalibrated after the modifications have been performed. Procedures for calibration may be obtained from the Science and Technology Branch or Regional Technical Support Groups. The laboratory can provide contact names and additional information.

It is very difficult to change the filter in the field. It is recommended that the installation and removal of the filter in the Hi-Vol cassette be done off-site. The entire cassette assembly is then attached to the Hi-vol sampling device.

After exposure, the filter is removed from the cassette, placed on the 20 x 25 cm separator sheet supplied with the filter, and both are then folded along the 20 cm width. The folded filter and separator are placed within a glassine envelope and mailed to the laboratory in the usual kraft paper Hi-Vol envelope, together with all pertinent sampling data. Samples requiring asbestos analysis should be sent to the Microscopy & Special Projects Unit at the Laboratory Services Branch.

Fluoridation Rate

Fluoridation rates are measured using the appropriate candle. These candles may be obtained from the Inorganic Air Unit. Protective shelters are provided and installed by the regional staff. Normal exposure time is 30 days. The exposed candle should be carefully replaced in its protective cover, placed in its shipping container and sent to the Laboratory Services Branch with the appropriate LIMS form. Proper sealing of the candle is important to prevent further atmospheric reaction occurring during transit. The duration of exposure must be recorded and submitted with the candle.

Volatile Organic Compounds (VOC)

Samples for the analysis of organic components such as ***volatile aliphatic and aromatic hydrocarbons, and organohalides*** may be collected by passing air through a specially prepared tube containing an adsorbent such as Carbosieve and Carbotrap B and C. The direction of air flow must follow the arrow marked on the tube. The normal sampling period is 24 hours at a flow rate between 5 to 350 mL per minute. The tubes are available from the Organic Air Unit, Laboratory Services Branch.

The sample, once collected, must be capped, refrigerated and kept in the dark. The sample label attached to the tube must have the following information marked on it:

i) Date and location sampled

ii) Pump time on and off

iii) Air flow rate at the start and finish

iv) Wind speed, direction, and temperature over the sampling period.

Samples should be sent as quickly as possible to the Organic Air Unit, Laboratory Services Branch.

Modified High Volume for Organic Compounds

"High volume" sampling techniques use a combination of Teflon-coated glass fibre filters and an XAD-2 resin cartridge. Semi-volatile compounds such as ***chlorinated benzenes, polychlorinated biphenyls (PCB's), polynuclear-aromatic hydrocarbons (PAH's), organochlorine pesticides*** etc. may be collected by passing 400 to 2800 cubic meters of air through the sampling device over a 24 to 96-hour period. Filters and cartridges may be obtained from the Organic Air Unit. Special sampling equipment is available by consultation with laboratory staff. Samples for the analysis of ***polychlorinated dibenzodioxins and polychlorinated dibenzofurans*** are collected using proven clean glass fibre filters and polyurethane foam plugs (PUFs). Filters and cartridges can be obtained from the Dioxin/Furan Unit, Drinking Water Analyses Section, Laboratory Services Branch.

B.2 Non-Routine Techniques

The following techniques may be used in special circumstances after discussion with laboratory staff of the Inorganic or Organic Air Units.

Grab Samples

An alternative way of sampling for ***volatile contaminants*** is by collecting a ***"grab"*** sample in Tedlar bags, aluminized Mylar bags, evacuated glass and metal containers, etc. These specialized containers are designed so that the analytes do not react with or become absorbed onto the material inside the container.

A grab sample is taken by pumping air into the bag or filling an evacuated container with air. This sampling method may be applicable in cases of ***odour problems, specifically volatile organic and inorganic sulphurous compounds such as H_2S and mercaptans***.

Detection Tubes

By observing the length of discolouration produced in a solid absorbent of a specific tube through which a known small volume of air is drawn, the approximate concentration of a pollutant can be estimated. This method is a rapid, semi-quantitative procedure for measuring high levels of gaseous pollutants (***SO_2, CO, H_2S***) in the field. These tubes and the sampling equipment are readily available from scientific or safety supply stores. The laboratories can provide guidance in the use and applicability of these tubes.

PM 10

The sampling device for PM 10 operates in an identical fashion to a Hi-vol sampler, except that it is fitted with an engineered top which excludes all particulate greater than 10 μm.

Stacks

Sampling of industrial and commercial stacks can be very complex and dangerous. Analytical work is carried out in conjunction with investigations on industrial source emissions. Special arrangements must be made with laboratory personnel from the Organic and Inorganic Air Units of the Laboratory Services Branch prior to sample collection.

Samples are obtained by inserting specially designed sampling probes into a stack. The gaseous or particulate emissions passing through the stack are collected by filtration, liquid scrubbing (impingers) and adsorption. Analytes such as ***chlorinated benzene, chlorinated phenols, polychlorinated biphenyls (PCB's), polynuclear aromatic hydrocarbons and volatile organic compounds*** must be collected with specially designed sampling equipment under isokinetic conditions.

Emission rates can be calculated from analysis of samples. Rigid procedures must be followed in stack sampling to ensure representative samples are taken.

B.3 Vegetation and Soil (Phytotoxicity)

General

The Phytotoxicology Section, Standards Development Branch is responsible for the investigation of all complaints concerning suspected contaminant injury to vegetation or contamination of soil, and the establishment of all vegetation and soil assessment surveys in the vicinity of proposed or existing industrial emission sources.

The exception is in the Mid Ontario and Northern Regions, where the work is performed by the Technical Support Sections, with assistance as required from Phytotoxicology personnel.

A complete field investigation procedural manual has been prepared for use by trained personnel from these sections.[24, 25]

Types of Investigations

i) Assessment Surveys

These surveys are normally conducted for one of three reasons: 1) to document endemic conditions prior to the establishment of emission sources; 2) to define the current state of air emissions from existing sources; and/or 3) to monitor source compliance with Ministerial orders.

Normally, a sampling network is developed. The network is like a spider web centred on the source. Samples are taken from fixed stations, located at increasing distance along radii from the source to the limits of suspected contamination. Consider-

ation is given to the location of air quality monitoring instruments, the availability of an appropriate material to sample, and meteorological parameters such as prevailing wind direction.

ii) Complaint Investigations

This type of sample is taken to evaluate situations where extensive damage to vegetation is observed. Cases of this nature are usually drawn to the Ministry's attention through complaints by members of the public. All complaints of this nature are referred to the Phytotoxicology Section, who will then investigate and report their findings to the District Office for distribution to the individual originating the complaint and to the source of the contaminant.

Sampling Procedures

Correct interpretation of analytical data requires that all samples for comparison be carefully matched with regard to plant species, age or maturity of leaf tissues, age of tree or shrub and position of sample on tree or shrub.

Foliage (including petioles) is normally collected from the side of the tree or shrub facing the presumed source of air pollution but, occasionally, a second sample is taken from the side opposite from the source. Samples are taken by trimming outside growth from ground level up to 6 meters or more and collecting all leaves on a shoot to provide a composite sample of 200 to 500 grams of fresh material.

Samples are placed into perforated polyethylene or paper bags and are transferred to refrigerated storage as soon

as possible for processing in the Phytotoxicology laboratory. When samples can be dried shortly after collection, foliage samples are placed directly into paper bags.

Forage samples (mainly grass) are collected by cutting the terminal portions of stems and leaf blades over the representative area to be sampled. Dried flower heads and stalks are discarded and root material is excluded. The different forage species included in the sample are identified and should be representative of the population of the species in the field. Any sample contaminated by roadside dust should be noted in the accompanying request form.

Soil samples are normally collected in conjunction with vegetation samples as an aid to differentiate between current and past emission situations. Occasionally, soil samples are collected to establish background conditions. Ideally, these background soil samples are taken from an undisturbed or beneath a sodded area. Contaminated situations should be as closely matched as possible with conditions existing immediately outside of the area.

Soil is collected with a 2 cm diameter stainless steel tube. A minimum of 10 cores is taken from a representative area of the sampling site. The collection form is completed to describe the texture of the soil and the overall sampling site. Depending on the survey emphasis, the cores may be separated into fractional depths of 0-5 cm, 5-10 cm and 10-15 cm. Each level is placed in an appropriately labelled plastic bag.

Special care is required in dealing with soil samples that will be submitted for analysis of ***organic compounds***. Soil samples may be collected with a soil sampling tube as for routine samples. It may be desirable to place and mix the soil cores in a stainless steel mixing bowl then distribute

them as required to the appropriate brown, wide-mouth sample bottles for submission to Laboratory Services Branch without further preparation.

All sampling equipment must be thoroughly cleaned between sample sites to prevent cross contamination. This includes the soil sampling tube, the mixing bowl and any other mixing device. In no case should these come into contact with any plastic material or any surface that might be contaminated. The cleaning procedure includes washing the equipment in a soap solution (aided by a scrubbing brush if necessary), rinsing with distilled water.

If the samples are being taken for ***organics analysis***, the water rinses are followed by rinses with acetone and hexane.

> ***THE USE OF SOLVENTS CAN POSE A HEALTH RISK UNLESS USED IN WELL VENTILATED CONDITIONS. PLEASE CONSULT THE APPROPRIATE MATERIAL SAFETY DATA SHEET, AVAILABLE FROM EITHER THE LABORATORY OR THE SOLVENT SUPPLIER.***

Preservation/ Stabilization

All vegetation samples, as collected, are potentially unstable, and will decompose unless properly handled.

Care is taken to ensure that samples are not exposed to the sun and are placed in refrigerated storage until they can be processed. When dried at 80°C for 36 hours (depending on original moisture content) in a forced draft oven, they become almost permanently stable. Drying is suitable for ***inorganic parameters*** only. Process-

ing/drying/grinding is carried out in the Phytotoxicology Section Laboratory. Particularly wet samples of fruits and vegetables may require longer periods of drying. For ***organic analyses***, fresh vegetation samples can be frozen and provided to the laboratory as soon as possible.

Soil samples are spread out on non-metallic trays and air-dried for a minimum of 48 hours, or until completely dry. They are then sieved/screened according to standardized procedure of the Phytotoxicology Section Laboratory.

Dried soil samples are roughly desegregated with a mallet and sieved to <2mm (10 mesh ASTM) to remove stones and organic fragments. A portion of this sample is selected and ground in a mortar and pestle such that this entire portion will pass through a 35 μm (45 mesh ASTM) sieve. The 45 mesh portion is submitted to LSB for chemical analysis in labelled glass jars. If required, a portion of the 10 mesh fraction is utilized for determination of soil ***pH or electrical conductivity***.

Identification

Collection of vegetation and soil samples is accompanied by the use of pre-numbered identification stickers and the completion of special Terrestrial Effects LIS forms which will later provide all the necessary information required for interpretation of the test results. A portion of the numbered sticker is detachable and placed in a smaller bag which is included with the sample for identification.

C. Sediment, Solid Wastes, Soil and Biomaterials

General

There are five areas within the Laboratory Services Branch that analyze these types of samples.

i) Vegetation & Soil Unit - This unit provides ***inorganic and physical testing*** for soil, sediment and vegetation samples.

ii) Biomaterials & Sediment Unit - This unit provides low level ***organic analysis*** of sediment, soil, vegetation and biota. ***PCB, PAH, organochlorine pesticides and chlorophenols*** are analyzed here.

iii) Organic Mass Spectrometry Unit - This unit performs characterization of ***unknown extractable organics*** in soil, sediment, vegetation and solid waste.

iv) Dioxin/Furan Unit - This unit tests soil,sediment, solid waste, vegetation and biota for ***dioxins and furans***.

v) Litigation & Waste Analyses Section - This section provides ***inorganic and organic analysis*** for solid industrial waste, landfill materials, sewage, sewage sludge and biota.

The two regional laboratories at London and Thunder Bay also provide analysis for these sample types. For specifics on what services are offered, see Table 2.

Sampling Considerations

i) Composite samples will give a more representative sample than a single grab sample.

ii) All possible sources of sample contamination should be absent or at least reduced to a minimum.

iii) Chemical preservatives are generally not applicable.

iv) Preparation of these types of samples for chemical analysis generally takes longer than for water or effluent. As a result, samples requiring immediate attention should be so marked and the laboratory must be notified well in advance. Notification of a heavy sample and/or test workload is essential.

Containers

Wide mouth 60, 125, 250, 500 or 1000 mL glass and plastic containers are available from Central Stores. The exact container used depends on suitability to the requested test and sample size. When a number of samples are submitted as a series, uniformity of sample container size is recommended for shipping, handling and storage convenience. Plastic bags (Whirl-pak type) are acceptable for vegetation samples requiring ***inorganic*** analysis. Indicate the number of containers for a sample when there is more than one.

Glass containers must be used for samples requiring organic analysis. Wide mouth glass containers with Teflon-lined or foil-lined lids are used for collection of samples for ***dioxins/furans*** analysis. Containers should be clearly labelled and samples numbered in sequence,

preferably from No. 1. Amber glass jars are required for ***PAH*** analyses.

Preservation Techniques

Chemical preservation techniques are generally not applicable to solid type samples. In the short term, during sampling and transportation, storage between 10°C and freezing will minimize the sample degradation and analyte losses. Freezing is essential if testing for a ***soluble or volatile analyte***.

Drying as a preservation technique is recommended for those samples requiring analysis of ***inorganics and metals***. Information on appropriate drying procedures can be obtained from the Air and Biomaterial Analyses Section. In general, dried samples are indefinitely stable.

Air or oven drying of vegetation samples at 80°C and grinding with a Wiley mill before submission to the laboratory is recommended. Where this is not possible, the laboratory must be notified in order that the samples can be dried without delay. This is particularly important since the ***nutrient*** content of plant material could be significantly altered by decay.

Sample Size

Due to the general non-homogeneity of solid samples, the minimum sample size identified allows for mixing to obtain a representative sample. As a general rule however, a sample which will yield 10-25 g of dry material will be sufficient for all the routine chemical analyses. Special analyses will require more sample, depending on the tests requested. Where it is not possible to obtain a sufficiently

large sample, special arrangements can be made with the laboratory personnel to perform the analyses in a given sequence so that the more important tests will be completed first.

If ***leachate tests*** are required on solid waste materials, larger sample sizes will usually be required (500 g). In this case do not dry before shipment.

Field Records

It is essential to keep field records that include details regarding the sampling methodology, procedures and apparatus (e.g. coring versus dredge devices) as this information can be helpful explaining any bias in the final results.

C.1 Fish Samples for Inorganic and Organic Contaminants Analyses

Analytical Testing Capabilities

Fish samples, normally muscle tissue, are frequently analyzed for ***mercury or other metals***; ***pesticides, PCB's and other organics***; and ***Dioxin/Furans***. The following sample procedures should be closely followed in order to obtain meaningful data as to the level and extent of contamination.

Field Records Sample Preparation

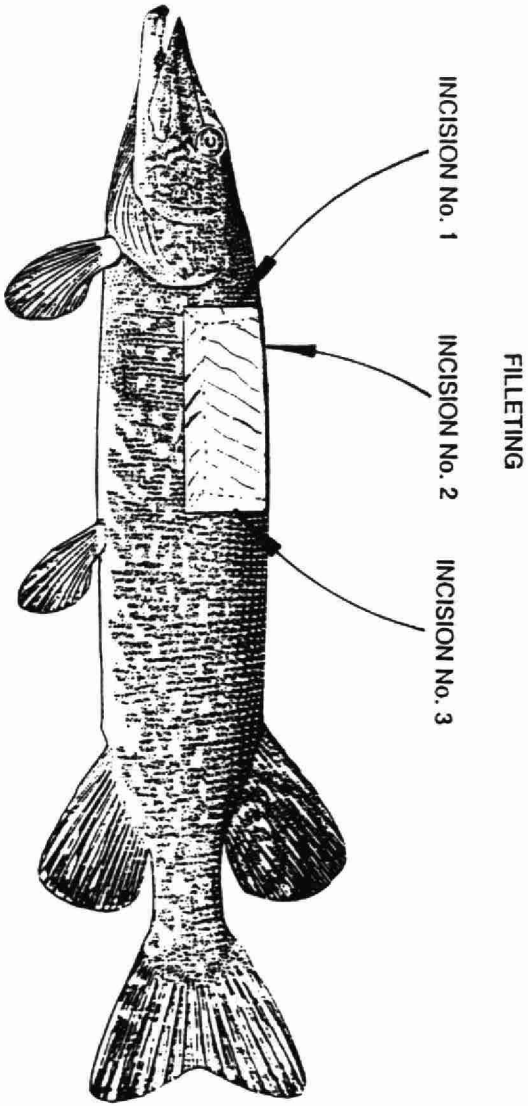
Details of catch, total length (cm), weight (g), sex (if possible) must be clearly recorded on the submission sheet. For proper statistical evaluation, there should be a minimum of 10 fish per species. As with all samples, the required analyses should also be indicated on the submission sheet.

Samplers are requested to submit fillets (rather than the whole fish) for analysis, with the exception of small fish ([12cm), which can be submitted whole in the appropriate container. For smelt, minnows and other small fish, separate the catch into groups of 10 fish of approximately the same length and wrap in aluminum foil. Ten fish/ package, 10 packages/location. The average length and weight of each package is recorded.

Normally, the analysis is carried out on tissue from the epaxial muscle (Figure I) by making an incision with a stainless steel knife on the dorsal surface of the fish as shown (Incision No. 1). The epaxial muscle is then removed by cutting from the initial incision toward the tail (Incision No. 2) until a sufficient quantity of tissue is obtained. The muscle may be finally separated from the body (Incision No. 3). The skin should be removed from the sample.

It is important not to remove tissue from below the lateral line because of the high fat content in this region which makes PCB analysis impractical. The sample must be frozen immediately after filleting and transported to the laboratory in this condition. This is the only acceptable preservation technique.

Figure I



When a collection is ready for shipment, and prior to shipping to the laboratory, please phone: for ***mercury or other metals*** -the Atomic Absorption Spectroscopy Unit; for ***pesticides, PCB's and other organics*** - the Biomaterial Analyses Unit; and for **Dioxin/Furans** - the Dioxins/Furans Unit, Laboratory Services Branch.

Sample Size

The minimum and preferred quantities of tissue required for each type of analysis are as follows:

Test	Absolute Minimum(gm)	Preferred(gm)
Mercury	20	50
Other Metals	50	100
PCB/pest	10	100
Dioxin/Furans	50	500

Containers

Individual samples collected only for ***metals and mercury*** analysis may be placed in small ***plastic bags and then*** frozen.

Clearly identify the sample. Use water-proof ink for printing the sample code on a masking tape label.

Samples collected for ***PCB or pesticide*** analysis must be wrapped in solvent-washed aluminum foil prior to freezing. Multiple washing of the foil and knife with hexane or acetone at the site is a necessity.

Samples submitted in plastic bags for these analyses will not be accepted. When both ***mercury and PCB's*** are required, submit the sample (frozen) in solvent washed foil.

Samples collected for ***dioxins/furans*** analyses should be a separate fillet.

Other Considerations

Analysis of tissues other than muscle is possible but will only be done by special arrangements. Direct queries to the appropriate analytical unit.

D. Court Cases and Complaints

Sampling in connection with legal action requires special care due to the influence this sampling may have on case outcome. Court cases are usually initiated to determine legal responsibility for reported pollution events (stream, well contamination, vegetation or paint damage, etc.) and sampling must be conducted with this purpose in mind. In general, standard sampling methods as described previously are used; however, the following additional points and techniques should be noted and understood before taking any legal samples.

D.1 Responsibilities

Field personnel are responsible for the samples and submission documents until they are received and signed for at the Laboratory by authorized Personnel.

i) Samples should be designated as ***"Legal"*** only when results are likely to be used for prosecution or appeal proceedings.

ii) Samples should be collected and transported to the Laboratory according to recommended procedures such as those set out in this booklet, other recognized Ministry sampling protocols, such as Clean Water Regulations, or according to specific instructions from appropriate Laboratory staff.

iii) Legal samples submitted via courier or outside of laboratory operating times should be preceded by a phone call to the Legal Samples Coordinator or designate (416-235-5863). If samples do not arrive at the laboratory when expected, laboratory staff will contact the submitter.

iv) All samples should be submitted with Legal Submission and Request for Legal Analysis forms completed and included with the samples. Alternately, samples may be submitted with the routine LIS Sample Submission and Request for Analysis forms along with the Case Submission/Receiving Report (see Section 4).

v) All submissions should be accompanied by a full description of the situation and any pertinent sampling details. Reference to previous samples should be made if possible. Keep the information factual and unbiased. If litigation proceeds, the forms may be required as a part of the court disclosure process. Include any Material Safety Data Sheets (MSDS) available or forward as soon as possible.

vi) Descriptions, sample locations, times and dates given on the Request for (Legal) Analysis forms must exactly correspond to those given on the sample container labels. Any differences must be accounted for and documented by the field staff submitting the samples.

vii) All samples listed on the Request for (Legal) Analysis forms must be accounted for.

viii) All sample containers or packing boxes should bear tamper-evident paper seals, preferably Ministry of the Environment and Energy, or locks. If paper seals are used, the seal tags should be attached to the Request for Legal Analysis form below the corresponding sample location description or to the Case Submission/Receiving Report (if used) beside the appropriate field number.

ix) The chain of custody must be maintained and documented. If this is not documented with the submission, the sampler will be contacted to determine whether the submission is still viable for litigation. Copies of shipping way bills should be maintained for custody tracking purposes.

x) All samples known to contain or suspected of containing hazardous materials ***MUST*** be labelled as such.

xi) Field staff are responsible for tracking down samples lost by third party carriers.

xii) Samplers requesting emergency sample priority must follow the guidelines in the High Priority Protocol (see Section 4, 4-16). This involves notifying the laboratory prior to sending the samples and getting authorization from the regional or branch representatives.

D.2 Laboratory Staff in Court

i) All requests for Analysts to appear in court or at meetings to discuss Legal submissions, shall be made through or passed on to the Legal Sample Coordinator (Rusty Moody 235-5863).

ii) Analysts are responsible for having any materials specified available for Court.

D.3 Chemical and Microbiological Analysis

The following points should be precisely adhered to when collecting court case water samples requiring chemical and microbiological analyses:

i) The sampling area should be completely ***"walked"***, i.e. checked over at the time samples are taken, so that the sampler is completely familiar with the overall geographic ***"picture"***. The sampler must identify ALL possible contamination sources, unusual occurrences, and a ***"blank"*** sample location far enough away (upstream) that no contamination from the sources in question can influence it. The sampler should also prepare a hand-drawn map of the area.

ii) The sampler should be careful to obtain samples at all possible contamination sources, not just the one in question. The observed contamination should be traced back to its source, and samples collected at all key points to show continuity. In the case of an underground sewer, when the accused or official agent is unwilling to confirm continuity of flow of wastes through the sewer, in front of a witness, the sampler should verify continuity by passing some small, identifiable floating object through the sewer and recovering it at the out-fall.

Similarly, a series of samples downstream are advised to show how the contamination effect persists. A prerequisite is a ***"control"*** unaffected by the alleged pollution obtained upstream or from a nearby well.

iii) The sampler should obtain prior knowledge of exactly what type of contamination he or she is dealing with (i.e. what parameter(s) will be measured), and

sample accordingly with respect to correct bottles, preservative, etc.

iv) Legal samples are generally analyzed in duplicate and thus it is recommended that at least three times the normal sample volume be submitted. Any remaining sample may then be used for further confirmation or presentation in court. All legal samples taken for microbiological analyses must arrive at the laboratory within 24 hours after sampling.

v) It is preferable, but not essential, that the actual sampling be performed with the assistance of a witness who is willing to sign an affidavit and appear in court, if necessary.

vi) A complete and accurate record of sampling locations, time and date, bottle numbers, preservatives, etc., must be made. Submission sheets should accompany the samples in the normal manner. However, it is emphasized that the sample description and number of the bottle must exactly correspond to that on the sheet. If not, the Certificate of Analysis can be questioned, and may not be accepted as evidence.

D.4 Particle Identification

In many instances, generally arising from citizens complaints, it becomes necessary for field personnel to collect samples for constituent identification by means of microscopic, x-ray diffraction, electron probe and other techniques. The types of material normally encountered are visible solids present in air or water, that are a cause of nuisance or concern to the complainant.

Air Samples

Dust fallout is a most frequent cause of complaints. Dust, adhering to any surface, may be removed by lifting it by means of transparent sticky tape. While sampling with the tape, it is useful to the analyst if the damaged spots or particles are circled on the nonstick side of the tape with a pencil or pen. When tape is used for sampling, it should be protected by means of covering strip which comes with the tape or attached to a glass microscope slide.

> ***WHEN TAPE IS USED TO SAMPLE PARTICULATES, UNDER NO CONDITIONS SHOULD THE TAPE BE FOLDED ON ITSELF.***

When sampling suspected soot fallout (especially oil soot), the use of tape is not advisable, as the pressure used in collecting it often destroys the identifying characteristics. In such cases, it is better to remove a small paint section from outside window sills, shutters, etc.

Plant leaves, eavestroughing, bird baths, furnace and air conditioner filters often act as collectors of particulate fallout. Where the fallout occurs consistently, aluminum weighing dishes, wetted with a glycerin-water mixture, can be used as miniature dustfall jars. These can be attached to a suitable vertical surface by means of a thumb tack. Samples can also be collected using a battery operated pump and a millepore field monitor containing a 0.4 um pore size Nucleopore filter. As a general rule, samples should not be collected from non-stationary objects such as automobiles, since the source of the dust may then be in question.

Damage to automobile paint or house sidings is generally caused by very acidic or basic materials attacking the paint surface. Such types of fallout should be tested on

the spot using pH indicator paper. It is often difficult to remove a representative sample from such surfaces, and on-site inspection by laboratory staff may be necessary to determine the cause of the damage.

Heavy dustfall onto snow should be sampled by scooping the snow into a large-mouth glass or plastic bottle in such a way as to maximize the amount of particulate material obtained and prevent any possible contamination from underlying soil.

Provide all the information required to make a proper assessment of the situation. A sketch map of the area is strongly recommended. Comparison samples of the suspected contaminants are always very useful in obtaining a positive identification of the fallout. Forward samples and forms to Microscopy and Special Projects Unit.

Water Samples

Water samples that require identification of suspended solids may be sent to the laboratory in any of the standard containers. A few milligrams of material are usually sufficient for microscopic analysis, although for complex mixtures requiring multi-instrument analysis, 2-3 g of material would be preferable. Submit samples for ***organic*** analysis to the Hazardous Waste Unit; ***inorganic*** testing to the Inorganic or Organic Air Units; and, if the material appears to be ***biological***, submit to the Aquatic Science Unit, Science and Technology Branch located at the Laboratory Services Branch.

D.5 Gas Damage Complaints

In cases of suspected gas damage, the stained surface, such as paint work, should be accompanied by an unstained sample, if available. Information as to the manufacturer and type of paint should also be obtained. Tarnishing of silverware or electrical contacts are usual indications of the presence of sulphide gases in the air.

Where any type of damage due to corrosion has occurred (aluminum sidings, automobiles, wire fences), it is best to have Ministry staff inspect the damage and collect the sample for analysis. Gas detection tubes (Draeger, Kitagawa) can be used for a large number of gases. These can be purchased commercially. For sampling organic vapours, the Laboratory will supply specially prepared absorbent tubes or sampling bags. For gas damage to plant material, consult the Phytotoxicology Section of the Standards Development Branch (416-323-5095).

Sample Submission

A. General Considerations

Ministry laboratories track and report sample workloads and results through a Laboratory Information System (LIS). In order to provide the best information regarding sample status in the laboratory, all samples are submitted to the laboratory with accurately completed LIS forms. This section provides guidance in the proper completion of these forms that will help to eliminate delays in sample processing and data reporting. The judicious selection of test codes also accelerates reporting by eliminating unnecessary testing. A final, careful cross-check of the sample, sample label, LIS submission forms and test requests can save you and the laboratory a lot of time.

Please call if you have any concerns, questions or information to share with the laboratory staff regarding your samples or sampling plans. Appendix 1 provides a list of key contacts to serve your needs.

IT IS ESSENTIAL TO MAKE ARRANGEMENTS WITH THE LABORATORY FOR DELIVERY OF SAMPLES OUTSIDE OF NORMAL LABORATORY OPERATING HOURS, ON WEEKENDS OR DURING STATUTORY HOLIDAYS. THIS WILL ENSURE PROMPT HANDLING AND APPROPRIATE STORAGE TO MINIMIZE SAMPLE DEGRADATION.

B. Sample Labelling and Communication with the Laboratory

Samples must be clearly labelled and display the following information:

i) A sample (sender's) number. The use of a simple, logical field numbering system is encouraged.

ii) Some form of location/identification, normally the sample source or type (e.g., "Lake Temagami - Sharp Rock Inlet" or "Lower water layer from tank").

iii) Presence of any chemical preservative added; all samples which do not contain preservatives will be kept refrigerated, frozen, or stored as appropriate, until the time of analysis.

iv) Samples which contain potentially dangerous or unusual substances, ***(e.g. arsenic, cyanide, mercury, PCB, dioxin,*** etc.), must be labelled for the protection of Laboratory personnel. The information must also be repeated on the sample submission forms. Also, note any sample contents which may interfere with analyses. Many reactions which produce false analytical results can be reduced or eliminated if the analyst is forewarned.

Direct communication with the analyst (Appendix 1) may be achieved in two ways:

a) Telephone call or visit to the Laboratory.
b) A note accompanying samples and addressed to the analyst in charge.

In all cases, a telephone call is recommended before submitting samples which need special attention. The sampler can then verify that the analysis is possible, find

out who will be responsible, and when the results should be available. In addition, they may arrange a mutually agreeable time to submit the samples and meet at the laboratory with the analyst or at least determine who should receive the note describing the samples. ***The note should be written on the bottom of the Submission Sheet and be marked "PLEASE NOTIFY (analyst's name) ON ARRIVAL".*** Sample reception will then contact the analyst as soon as the samples are unpacked.

C. Test Codes

All requests for laboratory analysis are identified through the use of LIS test codes. These codes are entered on the Request for Analysis Forms.

Each Ministry laboratory maintains a list of test codes which identifies all available analytical services.

The use of test codes and ensuring the proper spelling of each code is important. Each code uniquely identifies a single test within the laboratory for the LIS. Incorrect spelling or inappropriate test code use can result in lost or inappropriate analyses by the laboratory, wasting time and money and creating unnecessary delays in reporting results to customers.

If you require additional information regarding test codes, or to receive a copy of the test codes you use, please call the Customer Services Hotline at (416) 235-5839.

Customers of the Ministry laboratories currently use LIS test codes for their samples. During 1994, the LIS system will be replaced by the Laboratory Information Management System (LIMS) which is based upon laboratory "products" specified by sample type and a laboratory method code. A new product

catalogue will be developed and introduced into the guide as LIMS comes on-line.

D. Test Group Codes

Although the laboratories have analytical capabilities for many parameters, certain compatible groupings are requested frequently. Such test group requests are usually associated with routine monitoring programs and/or specific projects. It is the nature of the groupings to allow analysis of all the specified parameters on a single or duplicate sample bottle.

Requests for analysis using test groups are usually made only when **ALL** the parameters are required. Otherwise, delete tests from the group by noting them in ***"Deletion From Group"*** box on request for Analysis Sheets.

> ***REMEMBER, UNNECESSARY TESTS BURDEN THE ANALYTICAL CAPACITY OF THE LABORATORIES AND CAN DELAY FINAL REPORTING***

When an environmental program requires specific, individual analyses to be performed, use of these groups is of little value. However, large projects and studies may find it advantageous to use a test grouping and these may be established after consultation through the Laboratory Services Branch Customer Services Hotline (416) 235-5839.

E. Completing Submission Forms

There are two documents used in submitting a sample to the Laboratory Services Branch for analysis, namely:

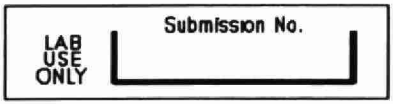
The Submission of Samples Form (Figure II, page 4-8), which is used to enter data that is common to all samples in a submission such as sampling program, sampler's name etc., and The Request for Analysis Form (Figure III, page 4-15), which is used to enter the sample information and the tests required. Data for six field samples may be entered on each sheet. If there are more than six samples in the submission, use as many sheets as required. It is possible to have a submission form customized for a well established program or project. If you would like to discuss your needs in this regard, please contact the Customer Service Unit, Laboratory Services Branch.

On the following pages, the individual fields on both forms are explained.

Provision has also been made to capture field data and observations. This data will be passed to the Sample Information System (SIS) for long term storage and retrieval. Field results cover such items as water temperature, sample depth etc., and are entered on forms prepared by the appropriate program manager.

E.1 Coding Requirements for "Submission of Samples" Form

The following is to be used as a guide to filling in the Submission Form.



The submission number is a unique number for any particular submission of samples and ***must not be duplicated or reused*** for any other submission. The submission number is usually pre-printed on the form in a sequential series for a Region or major sampling program. Alternatively, some regions have assigned a coded number of submission numbers to their users. If the submission number is ***not*** already on the form or if you are not using an assigned sequence, the submission number must remain blank, as sample reception staff will fill it in. They will enter a submission number which begins with the letters "CL" followed by five digits.

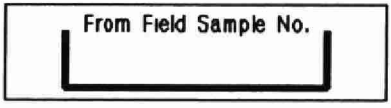
> ***THE SUBMISSION NUMBER IS THE MAIN IDENTIFICATION FOR INDIVIDUAL SAMPLES WITHIN THE LIS. THIS NUMBER MUST BE WRITTEN DOWN BY THE SAMPLER FOR FUTURE REFERENCE.***

The given submission number can have up to eight digits, the first two must be alpha characters and indicate a region or branch (e.g. WC stands for West Central Region). The remaining six digits can be any combination of alpha characters or numbers.

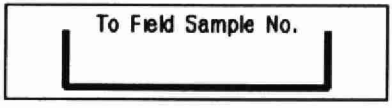
If a wide variety of tests are requested for a submission and one test takes much longer to perform than the others, it may be wise to separate the tests into two submissions. Laboratory staff can provide guidance in this regard.

This way a portion of the results can be processed and mailed. Otherwise the whole submission will be held until

all tests are completed. To keep track of the submissions either use consecutive numbers or use an A and B for the eight digits to indicate two groups.



Enter the first field number shown on the Request for Analysis or Field Data forms. Ensure that this number is also on the sample container(s) for this sample. Up to eight characters can be used for these field numbers, so the sampler can use some of the characters to designate the sampling location (e.g. stpraw, stpeff2, stpsldg1 can be used to designate raw, effluent stream 2 and sludge tank 1 respectively). Legal seal numbers are often used for field sample numbers in cases of litigation.



Enter the last field sample number shown on the Request for Analysis or Field Data forms. Ensure that this number is also on the sample container(s) for this sample.

It is easier for sample reception staff to line up and number samples if the samples are numbered in some sort of logical sequence.

Enter 1 in the first box and the total number of sheets in the submission (i.e. the number of Request for Analysis pages plus one).

THE ABOVE THREE FIELDS ASSIST THE SAMPLE RECEPTION STAFF TO ENSURE THAT ALL SAMPLES HAVE ARRIVED AT THE LABORATORY. IF THERE IS A DISCREPANCY, SAMPLE RECEPTION STAFF WILL CONTACT YOU.

SUBMISSION OF SAMPLES FORM

Ministry of the Environment
Ontario

Submission of Samples
Laboratory Information System

Lab Use Only

Submission No. CE 170123

From Field Sample No

To Field Sample No

Page of

Sample Program Code: Prog | Study | Proj Act | Subj Prog Act | Lab | PI | FD Type | Sampling Agency: Mth | Dn | Bn Reg | Sec | Unit | Area | Bath | Date Submitted: yr | mm | dd

Prov/Municipal Code | Municipality/Project | Name of Sampler | Telephone Number

Client Code 1 | Report to (Name) | Telephone Number | Establishment

Address | City | Province | Postal Code

– Copies To –

Client Code 2 | Name | Telephone Number

Establishment

Address

City | Province (Country) | Postal Code

Client Code 3 | Name | Telephone Number

Establishment

Address

City | Province (Country) | Postal Code

Client Code 4 | Name | Telephone Number

Establishment

Address

City | Province (Country) | Postal Code

Client Code 5 | Name | Telephone Number

Establishment

Address

City | Province (Country) | Postal Code

Potentially Hazardous Sample Information
(To be completed by Sampler if there is a suspected potential hazard associated with this Submission)

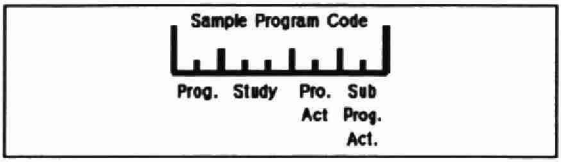
Sample No | Sample Identifier

Sample Source | Laboratory Contact Made With

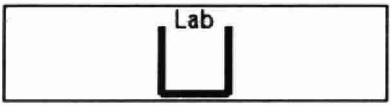
Field Precautions

WHMIS

Health
Flammability
Reactivity
Protection

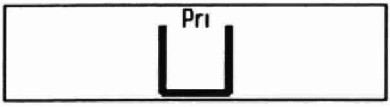


Seven to nine digits **are** entered here to define the Ministry's sampling program for which this set of samples was collected. With the exception of Legal Submissions (which require only the 2 digits -77), **seven digits are mandatory** and some programs have nine.

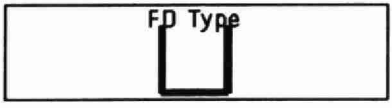


A two character code is to be entered here to indicate which laboratory will receive the submission. The Laboratory locations and the corresponding 2 character codes are as follows:

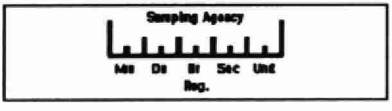
Dorset	DO
Kingston	KI
London	LO
Mobile	MO
Mobile, Trace Organics	MU
Sudbury	SU
Thunder Bay	TB
Toronto, Resources Road	TR



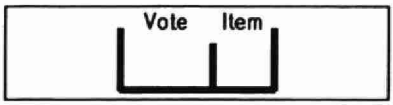
Enter the priority of the submission using "H" for high or "N" for normal. The laboratory has established a protocol for High Priority samples requiring written authorization and prior laboratory consent for the use of the high priority designation. This protocol is described in Sub-Section F of this section.



Certain sampling programs require that field data be captured by LIS for subsequent transfer to SIS. If your submission is associated with such a program, enter the appropriate 2 character code, otherwise, leave it blank.



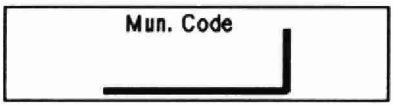
Up to 10 characters are to be entered here to identify the organizational unit responsible for collecting and shipping the samples. The first two digits represent the Ministry (i.e. 01 for MOEE), the next 2 digits stand for the division within the Ministry (i.e. 01 for regional operations). The next 2 digits refer to region or branch (i.e. 01 for South-western Region..06 for Northern Region). Digits 7 and 8 refer to the section (i.e. 01 for municipal and private abatement, 02 - industrial abatement, 04 - tech support), and the final 2 digits represent the unit.



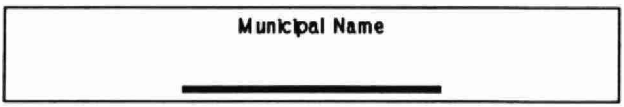
Not currently used, leave blank

Enter the numeric codes for day, month and year on which the submission was shipped or delivered to the laboratory.

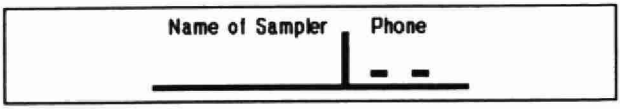
THE FORMAT FOR THE DATE IS DD/MM/YY. KEEP THIS FORMAT CONSISTENT ON THIS PAGE, THE REQUEST FOR ANALYSIS FORM AND ALL SAMPLE CONTAINERS.



Not currently used, leave blank.



Up to 24 characters may be entered here to indicate the municipality or geographical area from which the samples originate. This information is important as it could be used for tracking purposes.



Enter the sampler's surname and initial (up to 20 characters in total) and phone number (include area code).

If sample reception staff have questions about the samples, this provides them with a contact.

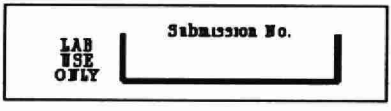
Enter the client code and name of the primary recipient of the final report, or, if this person does not have a client code, complete all other fields.

FOR LEGAL SAMPLES, ENTER THE CODE "CLWBM" AND FILL IN ALL OTHER FIELDS. NO REPORTS ARE ISSUED FROM LIS FOR LEGAL SAMPLES. THIS CODE ENSURES THAT LEGAL ANALYSIS REPORTS ARE KEPT CONFIDENTIAL BETWEEN THE LABORATORY AND THE CUSTOMER.

Enter the client code and name of any other persons who are to receive a copy of this report. Although the format of the areas for client codes 2 to 5 differs from that of the primary client, the same information is required for each client.

E.2 Coding Requirements for Request for Analysis Form

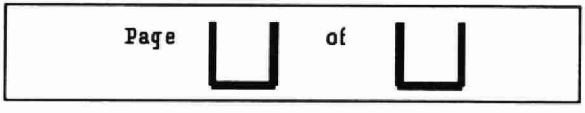
The following is to be used as a guide to filling in the *"Request for Analysis"* form (Fig.III, page 4-15).



LAB
USE
ONLY

Submission No.

Transcribe the submission number from the Submission Sheet.

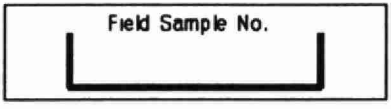


Page ☐ of ☐

Enter the page number of this sheet and the total number of pages in the submission. Since the Submission sheet is page 1, the first Request for Analysis sheet is page 2.

Sample Reception staff use this number to tell if all samples for a submission are present. They will call the sampler if there is a discrepancy.

A FIELD SAMPLE IS DEFINED AS A SAMPLE TAKEN FROM A SPECIFIC SAMPLING POINT, AT A SPECIFIC TIME, PLACED IN SUITABLE CONTAINERS WITH APPROPRIATE PRESRVATIVES FOR THE TEST(S) REQUESTED. FOR EACH FIELD SAMPLE, THE FOLLOWING INFORMATION IS REQUIRED.



Up to eight characters can be used to number field samples. Since this number also appears on the sample label, many samplers employ very simple numbering schemes. Ensure that this number is also on the sample container(s) for this sample. Since eight characters can be used for these field numbers, the sampler can use some of the characters to designate the sampling location (i.e. stpraw, stpeff2, stpsldg1 can be used to designate raw, effluent stream 2 and sludge tank 1). Dates or legal seal numbers are often used for field sample numbers.

REQUEST ANALYSIS FORM

Ministry of the Environment
Ontario

Request for Analysis

Shaded Area for Lab Use Only

Submission No.	Page of

Field Sample No.	Type	Lab Sample Numbers
SIS Type		

Con. Sent	Con. Miss.	Sample Date	Time	Zone	Remarks
				5	

Sample Location/Station I.D.	Sample Description Type

Test Group	Deletions From Group	Individual Tests

Field Sample No.	Type	Lab Sample Numbers
SIS Type		

Con. Sent	Con. Miss.	Sample Date	Time	Zone	Remarks
				5	

Sample Location/Station I.D.	Sample Description Type

Test Group	Deletions From Group	Individual Tests

Field Sample No.	Type	Lab Sample Numbers
SIS Type		

Con. Sent	Con. Miss.	Sample Date	Time	Zone	Remarks
				5	

Sample Location/Station I.D.	Sample Description Type

Test Group	Deletions From Group	Individual Tests

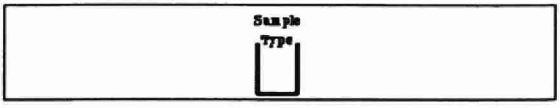
Field Sample No.	Type	Lab Sample Numbers
SIS Type		

Con. Sent	Con. Miss.	Sample Date	Time	Zone	Remarks
				5	

Sample Location/Station I.D.	Sample Description Type

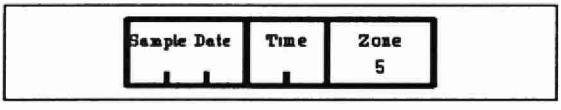
Test Group	Deletions From Group	Individual Tests

*448 (08/90) Front



For some sampling programs, specific instructions have een given for field staff to enter the appropriate code. In most cases, this is filled in by Sample Reception staff. Samples are routed to different testing areas within the laboratory based on this code. An incorrect code may route the sample to an inappropriate product area. Unless you have received specific instructions to the contrary, leave this area blank.

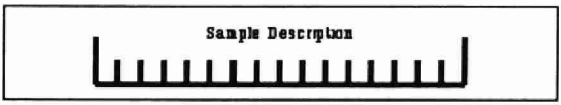
Enter the total number of containers (suitable containers, preserved appropriately) collected for this field sample. Sample Reception staff use this number to tell if all containers for a sample are present. If there is a discrepancy, they will call the sampler. Sample Reception staff will fill out the containers missing section if needed.



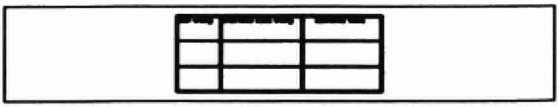
Enter the date (dd/mm/yy) and, if appropriate for data interpretation, the time (24 hour clock) that the sample was taken. Time Zone 5 (Eastern) is appropriate for the majority of the province.

If data are to be stored/reported to SIS, use the appropriate structured code for the sampling program. For abatement purposes, give the sample location. 14 characters are available. Ensure that the location given here matches what is on the sample containers.

Some Request for Analysis forms have an additional field for up to 40 characters for an optional alphanumeric description of the sample location.



Up to 32 characters can be used here to describe relevant features of the sample or give further details of the sample location. Since some clients have found this space inadequate, we have added the facility for entering 3 additional lines of 40 characters each. Users desiring this capability should avail themselves of the appropriate special forms from LIS staff.



These three columns are used jointly to specify the complete set of tests for all containers of this submission. Tests have been given codes (up to 6 characters each) and many combinations of tests have been grouped to simplify the work of field staff as well as data entry staff. The valid codes for tests and test groups are available by calling the LSB Client Services **"Hotline"** at (416) 235-5839 from the Regional/Branch Liaison Group or from laboratory staff. The total testing requirements of the field sample are specified by selection of the appropriate combination of test groups and individual tests.

Enter test group codes only in the left hand column. If some of the tests included in these groups you have selected are not required, enter their individual test codes in the centre column for deletion.

For example, the code GWELL which is used for general well characterization, includes individual test codes for iron (FEUT) and manganese (MNUT). If these metals tests are not required, or if no acid preserved sample was collected for this sample, enter the codes FEUT and MNUT in the centre column for deletions.

If individual tests are required or to be added, specify their codes in the right hand column. The GWELL group code does not include the individual code for phenol, which is frequently requested. Place the code for phenol (PHNOL) in the right hand column if you collected a specially preserved bottle for this purpose.

ADDITIONAL INFORMATION, IN PARTICULAR MESSAGES TO ANALYSTS, SHOULD BE WRITTEN IN THE BLANK AREA AT THE BOTTOM OF THE SUBMISSION SHEET. IT WILL BE COPIED AND PASSED ON TO THE ANALYST.

Please write neatly or type the information on the Submission of Samples and Request for Analysis sheets.

Ensure that the Submission and Request for Analysis sheets are securely attached to the sample parcel. Seal the open end of the envelopes so that the contents do not fall out during transit.

Use only water resistant markers or pens when labelling containers and forms.

If there are any questions concerning proper test groups or filling out the LIS forms, call the LSB Customer Services "Hotline" (416) 235-5839 for assistance.

Sample Reception staff may not be able to process a submission if the forms or containers labels are not properly filled out. The samples will be stored until the necessary corrections are made by the sampler. Sample Reception staff will call if problems arise.

F. High Priority Samples Submission Protocol

Samples are designated as ***"High Priority"*** if collected as the result of a problem which: poses a direct threat to human health or may lead to an emergency environmental situation. Samples are analyzed on a priority basis only if they meet this requirement. The Laboratory Services Branch supports the activities of

all Regions of the Ministry, several Branches, Health Units and numerous municipalities. The Laboratory may have to deal with several high priority submissions at any given time. Do not make frivolous high priority requests as this may delay the analysis of samples which really do need immediate response.

Samples should be collected according to the procedures provided in this Guide to ensure high quality analysis information. In an emergency situation, when decisions have to be made quickly, noone should have to worry about questionable data which arise from contamination or deterioration of the sample due to improper sample collection or preservation.

It is appropriate that each MOEE Region and Branch designate a senior staff member and an alternate who will coordinate high priority submissions for their geographic area. High priority submissions must be authorized by this senior staff member and receipt of high priority samples must be preceded by a phone call to either the Laboratory Services Branch emergency response coordinator (416) 235-5863 or Manager of the appropriate Section in the Laboratory (see Appendix I).

The laboratory contact will: request a full description of the problem and sampling details; ensure that Sample Reception staff are notified and that the samples are received at the prescribed time and as described; confirm the submission is assigned an "H" priority; contact the appropriate analysts; and provide an estimated completion time.

All samples must be submitted through LIS. Laboratory staff can assist with finalizing the Submission and Request for Analysis forms. A signed authorization form from the senior regional coordinator must also accompany the samples or be forwarded as soon as possible. Submissions not meeting these requirements will be designated as Normal (N) priority and treated as such.

Make arrangements with laboratory staff for data reporting in emergency situations. This should include 24 hour phone numbers for the primary contact person and backup.

During off-hours, samplers should phone the Spills Action Centre (SAC) (416) 325-3000 if analytical support is needed. SAC will make the necessary arrangements with Laboratory staff. Two Laboratory management staff are on call at all times for emergency situations.

LIS does not have the ability to designate certain samples or tests for a submission as high priority and others as routine. Do not include samples or tests for routine monitoring purposes in a high priority submission.

Sample Container Requisition and Shipping Procedures

A. Procedures

Sample containers for Ministry programs are provided by the laboratories. These may be ordered as needed using the information provided in Table 5.

Certain projects or studies may require the use of ***special container types***. Contact the appropriate laboratory staff, listed in Appendix 1, to discuss these needs.

A list of laboratory shipping addresses is provided in Appendix 2.

Courier services provide fast and reliable delivery of environmental water samples in Ontario. Air express, parcel post, bus companies and other services discourage the shipment of environmental samples because of the potential damage should there be any breakage.

Provincial, federal, and international regulations exist to control the transport of hazardous goods and samples. In particular, all samples transported for laboratory analysis must adhere to the requirements of WHMIS, an amendment to OHSA (see Section 2 - Safety Considerations).

CONTRACT OR WAYBILL NUMBERS PROVIDE THE ONLY MEANS FOR TRACING LOST SHIPMENTS TO THE LABORATORY. EVERY COURIER SHIPMENT IS ASSIGNED A CONTRACT NUMBER, BUT IT IS GENERALLY THE RESPONSIBILITY OF THE PERSON SAMPLING TO ATTACH THIS NUMBER TO EACH CARTON

OF A SHIPMENT. IDENTIFICATION STICKERS ARE PROVIDED BY MOST COURIER COMPANIES UPON REQUEST. PERSONS SUBMITTING SAMPLES ARE URGED TO KEEP A RECORD OF ALL THEIR CONTRACT NUMBERS.

1. Bernstein, B . B . and J. Zalinski. An Optimum Sampling Design and Power Tests for Environmental Biologists. J. Environ. Management 16:35-43. 1983.

2. Environment Canada. Water Quality Branch, Inland Waters Directorate, Ottawa. Sampling for Water Quality. 1983.

3. Kratochvil, B. Statistical Considerations in Sampling for Chemical Analysis of the Environment. In: Proc. of ACS Symposium: Role of Chemometrics in Pesticide/ Environmental Residue Analytical Determinations. ACS, Seattle, WA. March, 1983.

4. Maienthal, E.J. and D. A. Becker. A Survey on Current Literature on Sampling, Sample Handling, for Environmental Materials and Long Term Storage. Interface 5:49-62. 1976.

5. Ontario Ministry of the Environment. Primary Treatment and Sludge Digestion Workshop. Pollution Control Branch. 1977.

6. Ontario Ministry of the Environment. Outlines of Analytical Methods. Laboratory Services and Applied Research Branch. 1981.

7. United States Environmental Protection Aagency. Handbook for Sampling and Sample Preservation in Water and Wastewater. U.S. Environ. Monitoring and Support Lab., Cincinnati, Ohio. EPA-600/4-82-029. 1982.

8. Ontario Ministry of Environment & Energy. Thunder Bay Regional Laboratory Users Manual. June 1992.

9. Ontario Ministry of Environment & Energy. Dorset Laboratory Sampling Guide.

10. Ontario Ministry of Environment & Energy. Dioxins/Furans Monitoring Network Standard Operating Procedures.

11. Ontario Ministry of Environment & Energy. Technical and Operating Manual APIOS Deposition Monitoring Program. ISBN 0-7729-8302. January 1987.

12. Ontario Ministry of Environment & Energy. Technical and Operating Manual Toxic Deposition Monitoring Program Report # ARB 254-89.

13. Ontario Ministry of Environment & Energy. Volatile Organic Compounds Monitoring Network, Standard Operating Procedures and Technical Manual Report ISBN: 0-7729-6307-X # ARB 224-89.

14. Ontario Ministry of Environment & Energy. Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater. ISBN: 0-7729-8970-2. July 1992.

15. M.H. Marsh and I. Ahmad,Sampling, Processing and Analytical Protocols for Bulk Chemical Characterization of Soil, Rocks and Like Material, (Draft for OTR Policy). 1992.

16. W.A. Telliard, United States Environmental Protection Agency; Sampling Procedures and Protocols for the National Sewage Sludge Survey, 1988.

17. Alberta Environment. Sampling Manual for Pesticide Residues.

18. Addendum to Handbook for Sampling and Sample Preservation USEPA-60014-82-029.

19. Laurence H. Keith PhD., Environmental Sampling & Analysis: A Practical Guide, Lewis Publishers.

20. Ontario Ministry of Environment & Energy, Safety Policy Manual, Human Resources Branch.

21. Occupational Health and Safety Act and Regulations for Industrial Establishments, Revised Statues of Ontario, 1993.

22. ASTM publication, Gaseous Fuels; Coal and Coke; Atmospheric Analysis, Part 26, November, 1980.

23. McIlveen, W.D. and D.L. McLaughlin. Field Investigation manual: Part 1 General Methodology. Report No. 014-3511-93. Phytotoxicology Section, Hazardous Contaminants Branch, Ontario Ministry of Environment and Energy. 97 pp. 1993.

24. McIlveen, W.D. and D.L. McLaughlin. Field Investigation manual: Part 2A Methodology for Phytotoxicology investigators. Report No. 015-3511-93. Phytotoxicology Section, Hazardous Contaminants Branch, Ontario Ministry of Environment and Energy. Looseleaf. 1993.

TABLES

ANALYTICAL TESTING CAPABILITIES

Inorganic Parameters

DESCRIPTION/PARAMETER	PARTICIPATING LABORATORIES							
	LSB				REGIONAL			
	CS	DW	WQ	AB	LW	LN	TB	KN
Aluminum	x			x	x	x	x	
Ammonia (Nitrogen)			x			x	x	x
Antimony	x			x(8)	x	x	x	
Arsenic	x			x(8)	x	x	x	
Barium	x			x(8)	x	x	x	
Beryllium	x			x(8)	x	x	x	
Bismuth	x				x	x	x	
Boron	x				x	x	x	
Cadmium	x			x(8)	x	x	x	
Calcium	x		x	x(8)	x	x	x	x
Chloride			x	x	x	x	x	x
Chlorine (Total Residual)			x					
Chlorine - Total (X-ray)				x				
Chromium (VI)	x				x	x		
Chromium (Total)	x			x(8)	x	x	x	
Cobalt	x			x(8)	x	x	x	
Copper	x			x	x	x	x	
Cyanide				x		x		
Fluoride			x	x		x	x	x
Iron	x			x(8)	x	x	x	x
Lead	x			x	x	x	x	
Lithium	x			x	x	x	x	

SAMPLE TYPE (3)	CONTAINER (1, 9)	PRESERVATION TECHNIQUE (2)	MINIMUM VOLUME
W,H,V,S,D,B	PET/Glass	pH 2	100 mL (5)
W	PET/Glass	Refrigerate	75 mL
W,H,V,S,D,B	PET/Glass	pH 2	100 mL (5)
W,V,S,D,B,H	PET/Glass	pH 2	50 mL
W,H,V,S,D,B	PET/Glass	pH 2	100 mL (5)
W,H,V,S,D,B	PET/Glass	pH 2	100 mL (5)
W,H,V,S,B,D	PET/Glass	pH 2	100 mL (5)
W,V,S,D,B	Plastic	pH 2	100 mL
W,H,V,S,D,B	PET/Glass	pH 2	100 mL
W	PET/Glass	None	75 mL
W,V,S,H	PET/Glass	None	50 mL
W	Glass	(6)	500 mL
H,D,V		None	
W,V,S,D	Glass Only	None	100 mL
W,H,V,S,D,B	PET/Glass	pH 2	100 mL (5)
W,H,V,S,D,B	PET/Glass	pH 2	100 mL (5)
W,H,V,S,D,B	PET/Glass	pH 2	100 mL (5)
W,V,S	PET/Glass	pH>12 (7)	150 mL (5)
W,H,V,B	PET/Glass	None	50 mL
W,H,V,S,D,B	PET/Glass	pH 2	100 mL (5)
W,H,V,S,D,B	PET/Glass	pH 2	100 mL (5)
W,H,V,S,D,B	PET/Glass	pH 2	100 mL (5)

Table 1 (continued)

DESCRIPTION / PARAMETER	PARTICIPATING LABORATORIES							
	LSB					REGIONAL		
	CS	DW	WQ	AB	LW	LN	TB	KN
Magnesium	x		x	x	x	x	x	x
Manganese	x			x(8)	x	x	x	
Mercury	x				x(4)	x(4)	x(4)	
Molybdenum	x			x	x	x	x	
Nickel	x			x	x	x	x	
Nitrate Nitrogen			x	x		x	x	x
Nitrite Nitrogen			x			x	x	x
Nitrate/Nitrite(Nitrogen)			x			x	x	x
Nitrogen - Total Kjeldah			x	x		x	x	x
Phosphorus - Total			x	x		x	x	x
Phosphorus - Reactive			x			x	x	x
Potassium			x	x	x	x	x	x
Selenium	x			x(8)	x	x	x	
Silicates - Reactive			x				x	
Silver	x			x	x	x	x	
Sodium	x		x	x	x	x	x	x
Strontium	x			x(8)	x	x	x	
Sulphate			x	x	x	x	x	x
Tellurium	x				x	x	x	
Thallium	x				x	x		
Titanium	x			x(8)	x	x	x	
Uranium	x			x	x	x		
Vanadium	x			x(8)	x	x	x	
Zinc	x			x(8)	x	x	x	

SAMPLE TYPE (3)	CONTAINER (9)	PRESERVATION TECHNIQUE (2)	MINIMUM VOLUME
W,H,V,S,D,B	Glass/Plastic	None	75 mL
W,H,V,S,D,B	Glass/Plastic	pH 2	100 mL (5)
W,V,S,B	Glass	(4)	200 mL
W,H,V,S,D,B	Glass/Plastic	pH 2	100 mL (5)
W,H,V,S,D,B	Glass/Plastic	pH 2	100 mL (5)
W,H,V,S,D	Glass/Plastic	Refrigerate	75 mL
W,V,S,D	Glass/Plastic	Refrigerate	75 mL
W,V,S,D	Glass/Plastic	Refrigerate	75 mL
W,V,S,D	Glass/Plastic	Refrigerate	75 mL
W,V,S,D,H	Glass/Plastic	Refrigerate	75 mL
W,V,S,D	Glass/Plastic	Refrigerate	75 mL
W,V,S,D,B,H	Glass/Plastic	None	40 mL
W,H,V,S,D,B	Glass/Plastic	pH 2	100 mL
W,	Plastic	None	50 mL
W,H,V,S,D,B	Glass/Plastic	pH 2	100 mL (5)
W,V,S,D,B	Glass/Plastic	None	40 mL
W,H,V,S,D,B	Glass/Plastic	pH 2	100 mL (5)
W,H,V,S,D,B	Glass/Plastic	None	50 mL
W,V,S,D,B	Glass/Plastic	pH 2	100 mL (5)
W,V,S,D,B	Glass/Plastic	pH 2	100 mL (5)
W,V,S,D,B	Glass/Plastic	pH 2	100 mL (5)
W,H,V,S,D,B	Glass/Plastic	pH 2	100 mL (5)
W,H,V,S,D,B	Glass/Plastic	pH 2	100 mL (5)
W,H,V,S,D,B	Glass/Plastic	pH 2	100 mL (5)

Table 1 (continued)

NOTE:

1. PET 500 containers are required for ultra-trace analysis; glass bottles, if used, must have non-metallic cap liners.

2. For aqueous samples requiring preservation to pH2, nitric acid preservative should be added AFTER the sample is placed in the bottle (pH2, is approximately equivalent to 20 drops per litre). Omit preservation only if the sample contains visible suspended solids or where a hazardous chemical reaction between the sample and the acid may occur, submit the sample unpreserved and label the bottle and submission sheets with the note "No Preservative".

3. Most of the metals listed for water (W) can be determined also on Hi-vol filters (H), vegetation/soils (V), sediment (S), and dustfall (D); some of the metals listed can be determined on biomaterials (B). For specific metals, contact appropriate Laboratory staff (Appendix 1).

4. A special milk dilution bottle (LSB Central Stores #8c) is used for Hg samples. Add 1-2 mL HNO_3 per 250 mL, followed by at least 10 drops of $K_2Cr_2O_7$. The $K_2Cr_2O_7$ solution should produce a definite yellow colour. Omit preservation only where dangerous reactions may occur, or where the sample is heavily contaminated with organic material and label the bottle and submission sheets with the note "No Preservative".

5. 500 mL required for preconcentration or ultra-trace analysis.

6. Since the measured constituents are perishable, analysis should ideally be performed on-site. For lab analysis, after proper sampling and refrigeration, samples must be submitted within 4 hours of collection with prior laboratory notification.

7. Preservation of samples for cyanide required a pH >12. This is achieved by adding 2 mL (20 drops) of 10 N Sodium Hydroxide (NaOH) to one litre of sample.

8. Trace metals that are contaminants in glass fibre filters can be analyzed on special filters (Polyflon, Quartz, etc.). Consult staff of the Inorganic Air Unit.

9. A listing of the sample containers, available from LSB Central Stores, for each sample type is provided in Table 5.

10. Participating laboratories include:

DW	Drinking Water Analyses Section (DWA)
WQ	Water Quality Analyses Section (WQA)
AB	Air & Biomaterials Analyses Section (ABA)
LW	Litigation & Waste Analyses Section (LWA)
CS	Customer Services, Metals & Microbiology Section (CS)
LN	London Regional Laboratory
TB	Thunder Bay Regional Laboratory
KN	Kingston Regional Laboratory

Table 2

ANALYTICAL TESTING CAPABILITIES

Organic Parameters

DESCRIPTION/PARAMETER	PARTICIPATING LABORATORIES							
	LSB					REGIONAL		
	CS	DW	WQ	AB	LW	LN	TB	KN
Acid Extractables Base/Neutral Extractables								
Biochemical Oxygen Demand			x			x	x	x
Carbamate Insecticides/Herbicides		x						
Carbon - Free (Elemental)				x				
Carbon - (Dissolved Inorganic)			x					
Carbon - (Dissolved Organic)			x			x		
Carbon - (Inorganic)			x					
Carbon - (Total)				x				
Chemical Oxygen Demand			x			x	x	x
Chlorinated Aromatics		x		x	x			
Chlorophenoxy Acid Herbicides		x			x			
Dioxin/Furans		x						
Freons					x			
GC/MS Characterization:								
-Extractables		x						
-Purgeables		x						
Hydrocarbon Gases				x				
Methylene Blue Active Substances			x			x		
Organochlorine Pesticides		x		x	x		x	
Organophosphorus Insecticides		x						

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Laboratory Services Branch
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SAMPLE TYPE (1)	CONTAINER (5)	PRESERVATION TECHNIQUE	MINIMUM VOLUME	SPECIAL COMMENTS
WW,S	Glass	Refrigerate	1.0L	
W	Glass/Plastic	Refrigerate	500 mL	
W,H,V (4)	Glass (2)	Refrigerate	1.0L	
H	Hi-Vol	None	N/A	
W	Glass/Plastic	Refrigerate	50 mL	
W	Glass/Plastic	Refrigerate	50 mL	
W	Glass/Plastic	Refrigerate	50 mL	
W,H,V,S	Glass/Plastic	Refrigerate	50 mL	
W	Glass/Plastic	Refrigerate	25 mL	
W,H,V,S (4)	Glass (2)	Refrigerate	1.0L (B,S, V 10 g)	
W,H,V,S (4)	Glass (2)	Refrigerate	1.0L	
W,H,V,S, WW,A,B (4)	Glass (2)	Refrigerate	1.0L	Contact Dioxin Unit
W,H	Glass (2)	Refrigerate		Consult WasteWater Unit
				Consult M.S. Unit
W,H,S,V, WW,B	Glass (2)	Refrigerate	1.0L	Consult M.S. Unit
W,H,S,V,WW	Glass (2)	Refrigerate	1.0L (3)	NO Head Space
W,A	Tedlar Bags	Refrigerate		
W,H,V,S (4)	Glass (2)	Refrigerate	1.0L (S,V, 10 g)	
W,H,V,S (4)	Glass (2)	Refrigerate	1.0L (B,S, V, 10 g)	

Table 2 (continued)

DESCRIPTION/PARAMETER	PARTICIPATING LABORATORIES							
	LSB					REGIONAL		
	CS	DW	WQ	AB	LW	LN	TB	KN
Petroleum Hydrocarbons (Gasoline)		x			x			
Phenolics - Reactive Phenolics (Speciated)			x		x	x		
Phenyl Urea Herbicides		x			x			
Polybrominated Biphenyls		x			x			
Polychlorinated Biphenyls		x		x			x	
Polynuclear Aromatic Hydrocarbons		x		x	x		x	
Purgeables		x			x			
Resin and Fatty Acids					x			
Solvent Extractables				x	x			
Tannins and Lignins				x				
Tracer Dyes				x				
Triazine Herbicides		x						
Trihalomethanes		x			x			
Vinyl Chloride				x	x			
Volatile Organic Compounds				x	x	x		
Volatile Sulfurous Organics				x				

SAMPLE TYPE (1)	CONTAINER (5)	PRESERVATION TECHNIQUE	MINIMUM VOLUME	SPECIAL COMMENTS
W,A	Glass (2)	Refrigerate	1.0L	
W,H W,H	Glass (2) Glass (2)	H_2SO4 H_2SO_4	250 mL	A special bottle with preservative is available
W,H,V,S	Glass (2)	Refrigerate	1.0L	
W,A	Glass (2)	Refrigerate	1.0L	
W,B,S,V	Glass (2)	Refrigerate	1.0L (B,S,V, 10 g)	
W,B,S,V	Glass (2)	Refrigerate	1.0L (B,S,V, 10 g)	
W,WW	Glass	Refrigerate	1.0L	
W,WW	Glass	Refrigerate	1.0L	
W,WW	Glass	Refrigerate	1.0L	
W,WW	Glass	Refrigerate	200 mL	
W,WW				Consult Organic Air Unit
W,H,A,V,S, WW,B	Glass (2)	Refrigerate	1.0L (B,S,V,10 g)	
W,WW,S	Glass	Refrigerate	250 mL	
W,WW,S,A				
A	Multi-Phase Absorbent	4°C	7L of Air	
A	Tedlar Bags or Multi-Phase Absorbent			Consult Organic Air Unit

Table 2 (continued)

NOTE:

1. Most organics can be determined also on Hi-Vol filters (H), Air (A), vegetation/soils (V), Sediment (S), Waste (WW) and Biomaterials (B).

2. Special 1 L washed and baked containers are supplied (pack #3 PCB). Fill container to the shoulder, (approximately 900 mL).

3. Volume depends on size of container.

4. Container and sample size depend on the matrix sampled.

5. A listing of the sample containers, available from Laboratory Services Branch, Central Stores, for each sample type is provided in Table 5.

6. Participating laboratories include:

DW	Drinking Water Analyses Section (DWA)
WQ	Water Quality Analyses Section (WQA)
AB	Air & Biomaterials Analyses Section (ABA)
LW	Litigation & Waste Analyses Section (LWA)
CS	Customer Services, Metals & Microbiology Section (CS)
LN	London Regional Laboratory
TB	Thunder Bay Regional Laboratory
KN	Kingston Regional Laboratory

ANALYTICAL TESTING CAPABILITIES

Other Parameters

DESCRIPTION/PARAMETER	PARTICIPATING LABORATORIES							
	LSB					REGIONAL		
	CS	DW	WQ	AB	LW	LN	TB	KN
Acidity			x			x	x	x
Alkalinity			x			x	x	x
Asbestos					x			
Carbonate (Hi-Vol)				x				
Chlorophyll			x					
Colour - True			x			x	x	x
Colour Dilution			x					
Conductivity			x			x	x	x
Corrosivity (Industrial Waste)					x			
Dustfall				x		x	x	
Fluoridation Rate				x				
Flashpoint (Industrial Waste)					x			
Hardness			x			x	x	x
Leach Test (Industrial Waste)					x			
Loss on Ignition			x	x	x	x	x	
Moisture Content				x				
Nitrogen (Industrial Waste, Soil)				x				
Oxygen - Dissolved			x			x	x	x

SAMPLE TYPE (4)	CONTAINER (5)	PRESERVATION TECHNIQUE	MINIMUM VOLUME	SPECIAL COMMENTS
W	Glass/Plastic	Refrigerate	50 mL	
W	Glass/Plastic	None	75 mL	
W,H	Glass	Refrigerate	1 L	New Bottles Only
H	Filter	Keep Dry	1600 m^3	Glass or Quartz Fiber Exposed for 24 hours
W	(1)		500 mL	
W	Glass/Plastic	Refrigerate	75 mL	
W	Glass/Plastic	Refrigerate	50 mL	
W	Glass/Plastic	Refrigerate	75 mL	
WW,S		None		
A	6" x 12" Jar	None		30 Day Exposure
A	Fluoride Candle	Seal Candle		30 Day Exposure
WW,S				
W	Glass/Plastic	None	75 mL	
WW,S				
WW,S,V	Glass/Plastic	Refrigerate	500 mL	
WW,S	Glass	4°cC	5 - 10 g	
WW,S	Glass	Refrigerate		
W		(3)	500 mL	

Table 3 (continued)

DESCRIPTION/PARAMETER	PARTICIPATING LABORATORIES							
	LSB					REGIONAL		
	CS	DW	WQ	AB	LW	LN	TB	KN
Particle Size Analysis (Laser Beam)				x				
Particle Size by Microscopy (EM Unit)					x			
Particulate Indentification (Complaint)					x			
pH			x	x	x	x	x	x
Reactivity (Industrial Waste)				x				
Sieve Analysis				x	x			
Solids - Dissolved			x			x	x	x
Solids - Ignited			x		x	x	x	
Solids - Suspended			x			x	x	x
Solids - Total			x		x	x	x	x
Sulfide				x		x		
Sulfur - Total				x	x			
Suspended Air Particulates-Total				x			x	
Suspended Air Particulates-PM 10				x			x	
Turbidity			x			x	x	x

SAMPLE TYPE (4)	CONTAINER (5)	PRESERVATION TECHNIQUE	MINIMUM VOLUME	SPECIAL COMMENTS
S	Sediment Samples Only			Contact LWWA
A,WW	Non-Aqueous Samples Only			Contact EM Unit
A,WW,D	Aqueous and Non-Aqueous Samples			
V,S,W	Glass/Plastic	Refrigerate	50 mL	
	Glass/Plastic	Refrigerate	100 mL	
S,V				
S,WW	Glass/Plastic	Refrigerate	75-500 mL	
S,WW,SG	Glass/Plastic	Refrigerate	75-500 mL	
S,WW	Glass/Plastic	Refrigerate	75-500 mL	
S,WW,SG	Glass/Plastic	Refrigerate	75-500 mL	
W,WW	Glass	Note 2	250 mL	
A,H,WW,V,S				
H			1600 m^3	Glass Fibre Filters
H			1600 m^3	Quartz Fibre Filters Only
W	Glass/Plastic		50 mL	

NOTE:

1. In the field, filter up to 1000 Ml sample (minimum volume required 500 mL) through one nylon membrane filter (1.2 µm pore size, 47 mm dia: Central Stores Cat. No. F036-1). fold the filter in half avoiding exposure of the suspended matter, and place it on a filter pad (Cat. No. F066-1) in a plastic Petri dish equipped with a cover (Cat. No. D069-1). Record the volume (to the nearest 10 mL) of sample filtered, on the Petri dish. If field filtration is not feasible, submit one litre of sample in a glass container. For either dishes or bottles, protect samples from the light, refrigerate, and ship as soon as possible.

2. 2 mL of 2N Zinc Acetate per litre, followed by dropwise addition of 5% Sodium Carbonate solution until precipitation complete.

3. Due to the perishable nature of the measured constituents, analysis should ideally be performed on-site. For lab analysis, after proper sampling and refrigeration, samples must be submitted with 4 hours of collection with prior laboratory notification.

4. Matrix includes: Water (W), Waste Water (WW), Sediment (S), Air (A), Hi-Vol (H), Dustfall (D), Sludge (SG).

5. A listing of the sample containers, available from Laboratory Services Branch, Central Stores, for each sample type is provided in Table 5.

6. Participating laboratories include:

DW	Drinking Water Analyses Section (DWA)
WQ	Water Quality Analyses Section (WQA)
AB	Air & Biomaterials Analyses Section (ABA)
LW	Litigation & Waste Analyses Section (LWA)
CS	Customer Services, Metals & Microbiology Section (CS)
LN	London Regional Laboratory
TB	Thunder Bay Regional Laboratory
KN	Kingston Regional Laboratory

Table 4

ANALYTICAL TESTING CAPABILITIES

Microbiological Parameters

APPLICATION	DESCRIPTION / PARAMETER	PARTICIPATING LABORATORIES				
		LSB				
		WQ	DW	CS	AB	LW
Fecal Pollution	Coliforms - Total			x		
Indicators	Coliforms - Fecal			x		
	Enterococci			x		
	Escherichia coli			x		
	Fecal Streptococci			x		
Presence Absence Procedure				x		
Pseudomonas aeruginosa				x		
	Salmonella sp.			*		
Industrial	Klebsiella sp.			x		
Agricultural	Denitrifying bacteria			*		
	Nitrobacter sp.			*		
Pollution	Nitrosomonas sp.			*		
Indicators	Phenol Degraders			*		
	Sulfate Reducers			x		
	Nuisance Organisms			x		
Organic	Fungi			*		
Enrichment	Heterotrophic bacteria			x		
Indicators	- Surface Water			x		
	- Treated Water			x		
	Taxonomy			*		

* By Special Request

PARTICIPATING LABORATORIES			CONTAINER REQUIRED (1)	PRESERVATION TECHNIQUE	VOLUME REQUIRED	SPECIAL COMMENTS
REGIONAL						
LN	TB	KN				
x	x	x	300 mL PETG	Refrigerate	200 mL	
x	x	x	300 mL PETG	Refrigerate	200 mL	
x	x	*	300 mL PETG	Refrigerate	200 mL	
x	x	*	300 mL PETG	Refrigerate	200 mL	
x	x	x	300 mL PETG	Refrigerate	200 mL	
x	x	*	300 mL PETG	Refrigerate	200 mL	
x	x	*	300 mL PETG	Refrigerate	200 mL	
x	x		300 mL PETG	Refrigerate	500 - 1000 mL	
x	x	*	300 mL PETG	Refrigerate	200 mL	
x	x		300 mL PETG	Refrigerate	200 mL	Contact Lab
x	x		300 mL PETG	Refrigerate	200 mL	
x	x		300 mL PETG	Refrigerate	200 mL	Contact Lab
	x		300 mL PETG	Refrigerate	200 mL	Contact Lab
x	x	x	300 mL PETG	Refrigerate	200 mL	Contact Lab
x	x	x	300 mL PETG	Refrigerate	200 mL	
x			300 mL PETG	Refrigerate	200 mL	Contact Lab
x	x		300 mL PETG	Refrigerate	200 mL	
x	x		300 mL PETG	Refrigerate	200 mL	
x	x	*	300 mL PETG	Refrigerate	200 mL	Contact Lab

NOTE:

1. A listing of the sample containers, available from Laboratory Services Branch, Central Stores, for each sample type is provided in Table 5.

2. Participating laboratories include:

DW	Drinking Water Analyses Section (DWA)
WQ	Water Quality Analyses Section (WQA)
AB	Air & Biomaterials Analyses Section (ABA)
LW	Litigation & Waste Analyses Section (LWA)
CS	Customer Services, Metals & Microbiology Section (CS)
LN	London Regional Laboratory
TB	Thunder Bay Regional Laboratory
KN	Kingston Regional Laboratory

SAMPLE SUPPLIES - CENTRAL STORES (LSB)

SAMPLING CONTAINERS

TYPE OF SAMPLE/TEST	CONTAINER	PACK CONTENTS	PACK NUMBER	SPECIAL FEATURES
Water, liquid wastes - general purpose	500 mL PET plastic	6 bottles	PET 500-6	WM, PP cap
Water, Public Health domestic inspections	200 mL PP plastic	Each	B-200	Mailing sleeves extra (B-201)
Sludges, sediments: - general purpose (including metals) - organics	500 mL PET plastic 250 mL WM brown glass	6 bottles 12 jars	PET 500-6 Pack 5 PCB	WM, PP cap Foil liner - containers baked
Routine Organic Extractables: (includes dioxin, pesticides, PCBs) and aqueous orgnaic identification	1 L brown glass	6 bottles	PACK 3 PCB	Teflon liner
PCB in oil	30 mL glass	24 vials	PACK 21	PP liner
Phenols	250 mL glass (green label)	4 bottles 48 bottles	PACK 7S PACK 8S	Foil cap, with preservative
General chemical tests (mercury, sulphide)	250 mL glass (black label)	4 bottles 48 bottles	PACK 7C PACK 8C	Unsterilized, recycled
Volatile organic analysis and Purgeables trihalomethanes	40 mL glass vial (EPA) or 250 mL glass (black label)	Each 4 bottles 48 bottles	V-030 PACK 7C PACK 8C	Open cap with Teflon septum Foil liner, unsterilized recycled
Metals, precipitation	500 mL PET plastic	6 bottles	PET 500-6	WM, PP cap
Soils analysis - general	125 mL glass	24 jars	PACK 25	PP cap
Bacterial analysis	300 mL PETG (red label)	4 bottles 48 bottles 4 bottles 48 bottles	PACK 7T PACK 8T PACK 7TF PACK 8TF	Sterile bottles, thiosulphate added - Same, with foam liner
Aquatic Plants: - Lake, river, raw water, wells - Shoreline accumulations and scums	500 mL PET plastic, Plastic bag	6 bottles Each	PET 500-6 B-020	WM, PP cap "Whirl Pak" closure

Table 6

LIS USER REPRESENTATIVES

BRANCH/REGION	REPRESENTATIVE	PHONE #
Science & Technology Branch	Gerry Diamond	(416) 323-5212
Standards Development Branch	Bill McIlveen	(905) 456-2504
Environmental Monitoring and Reporting Branch	Peter Schaffer	(416) 235-5782
Program Development Branch	Vacant	
Central Region	Dhan Sharma	(416) 467-3022
West Central Region	Tracy Koolman	(416) 521-7671
Southeastern Region	David Ferguson	(613) 549-4000
Southwestern Region	Walter Cook	(519) 661-2266
Northeastern Region	Gerry Myslik	(705) 670-3241
Northwestern Region	Shirley Remmen	(705) 475-1770

EMERGENCY RESPONSE TASK FORCE (ERTF)
LABORATORY SERVICES BRANCH

		PHONE NUMBER
CENTRAL CO-ORDINATOR.....	Rusty Moody.....	(416) 235-5863
ERTF REPRESENTATIVES		
AIR AND BIOMATERIALS ANALYSES:.....	Dan Toner.....	(416) 235-6002
DRINKING WATER ANALYSES:.....	Vince Taguchi.....	(416) 235-5902
	Patrick Crozier.....	(416) 235-5910
LITIGATION AND WASTE ANALYSES:.....	Joe Osborne.....	(416) 235-5759
WATER QUALITY ANALYSES:.....	Frank Lo.....	(416) 235-5875
SECTION MANAGERS		
AIR AND BIOMATERIALS ANALYSES:.....	Dan Toner (A).....	(416) 235-5757
DRINKING WATER ANALYSES:.....	Serge Villard.....	(416) 235-5748
LITIGATION AND WASTE WATER ANALYSES:.	George Kanert.....	(416) 235-5848
WATER QUALITY ANALYSES:.....	Frank Tomassini...	(416) 235-5880
CUSTOMER SERVICE, METALS & MICROBIOLOGY:.....	George Crawford..	(416) 235-5757
SENIOR ENVIROMENTAL SCIENTIST (ORGANICS):.....	Otto Meresz.....	(416) 235-5762
AFTER HOURS SPILLS ACTION CENTRE: (SAC).....		(416) 325-3000

Appendix 1

LSB DIRECTOR'S OFFICE
Telephone: (416)235-5743
Fax: (416)235-5744

Contact Point	Contact Person	Phone Number
Director	Bern Schnyder	(416) 235-5747
Assistant Director	Serge Villard	(416) 235-5748
Operations Services	Vacant	(416) 235-5746
Safety Officer	Roy Ford	(416) 235-5853
Central Stores/Supplies	Walter Wright	(416) 235-5741
LSB Library	Norville McIlroy	(416) 235-5751
Staff Services	Cathy Doehler	(416) 235-6031
Scientific Consultation	Otto Meresz	(416) 235-6291

MOEE / LSB MAJOR PROGRAMS

Program	LSB Contact	Phone Number
• General Inquiries	Serge Villard	(416) 235-5748
• MISA (Municipal/Industrial Strategy for Abatement)	Patricia Baulu	(416) 235-6055
• APIOS (Acid Precipitation in Ontario Study)	Mike Rawlings	(416) 235-5880
• DWSP (Drinking Water Surveillance Program)	Serge Villard	(416) 235-5748
• FEE-FOR-SERVICE (Municipal and Clean Water Agency Analyses)	Wendy Moss	(416) 235-5738
• Air Monitoring Networks	Jerry Hipfner	(416) 235-5856

ANALYTICAL CONSULTATION

Program	LSB Contact	Phone Number
• Legal Samples/High Priority Authorization	Rusty Moody	(416) 235-6289
• Landfills/Wastes Analyses	Joe Osborne	(416) 235-6286
• Dioxins/Furans Analyses	Eric Reiner	(416) 235-5895
• Drinking Water (Inorganics)	Jenifer McBride	(416) 235-6288
• Drinking Water (Organics)	Patrick Crozier	(416) 235-6287

AIR & BIOMATERIAL ANALYSES SECTION
Telephone: (416) 235-5758
Fax: (416) 235-6110

This section provides analysis of organic and inorganic contaminants in air, biota, vegetation, soil and sediment. This section is also responsible for providing microscopy services for the identification of particulate matter. Following are the key contact persons for these services.

Contact Point	Contact Person	Alternative Person
Manager	Dan Toner (A) (416) 235-5755	
ERTF Representative	Dan Toner (416) 235-5755	Liz Pastorek (416) 235-5855
ORGANIC CONTAMINANTS ANALYSES		
• Air	Paul Yang (416) 235-6001	Mike Sage (416) 235-5983
• Sediment/Soil/ Vegetation/Biota	John Bodnar (416) 235-6016	Dan Toner (416) 235-5755
INORGANIC CONTAMINANTS ANALYSES		
• Air	Jerry Hipfner (416) 235-5856	Dave Sturgis (416) 235-5850
• Sediment/Soil/ Vegetation	Liz Pastorek (416) 235-5855	Jane Thrush (416) 235-6097
• Dustfall/Particulate Characterization, Identification and Complaints	Olaf Lindow (416) 235-5862	

ERTF, Emergency Response Task Force

CUSTOMER SERVICES, METALS AND MICROBIOLOGY SECTION

Telephone: (416) 235-5758
Fax: (416) 235-6110

This section is responsible for improving service quality at LSB. It's functions include customer services - identifying customer's needs and implementing the services to meet such needs; sample reception/data entry. The section also provides analytical services, specializing in microbiology and metals analysis by AAS, ICP and ICP/MS. Following are the key contact persons for these services.

Contact Point	Contact Person	Alternative Person
Manager	George Crawford (416) 235-5757	Anne Neary
CUSTOMER SERVICES		
• HOTLINE - Sample Status Information/Inquiries	Anne DeWet (416) 235-5839	Florida Maningas (416) 235-6008
• Scientific Assistance/Advice, New Method Requests Coordination	Ijax Ahmad (416) 235-6014	
• Fee-For-Service (Municipal and Clean Water Agency Analyses)	Wendy Moss (416) 235-5738	Sheri Teresi (416) 235-5997
• External Lab Contracts	Patricia Baulu (416) 235-6055	Sheri Teresi (416) 235-5997
METALS ANALYSIS		
• AAS (Biomaterials, Industrial Wastes)	Ram Sadana (416) 235-5861	
• Mercury, Hg and Heavy Metals in Fish	Ram Sadana (416) 235-5861	Darryl Russel (416) 235-5857
• ICP, ICP/MS (Drinking Water, Surface Waters, Biomaterials)	Dave Boomer (416) 235-5858	Mark Powell (416) 235-5834
MICROBIOLOGY		
• Analytical Capabilities	Gary Horsnell (416) 235-5886	

AAS **Atomic Absorption Spectroscopy**
ICP/MS **Inductively Coupled Plasma (Emission Spectroscopy)/Mass Spectrometry**

DRINKING WATER ANALYSES SECTION

Telephone: (416) 235-5900
Fax: (416) 235-5744

This section is responsible for the branch Quality Management Office and provides analyses of organic contaminants in drinking, surface, river and lake waters. The section is also responsible for providing the analysis of polychlorinated dibenzodioxins (PCDD)/polychlorinated dibenzofurans (PCDF) and characterization of unknown contaminants in all environmental matrices. Following are the key contact persons for these services.

Contact Point	Contact Person	Alternative Person(s)
Manager	Serge Villard (416) 235-5748	
ERTF Representative	Serge Villard (416) 235-5748	Eric Reiner (416) 235-5893
ORGANIC CONTAMINANTS ANALYSES		
• Scientific Advice	Bill Berg (416) 235-5907	
• Pesticides/ Herbicides/PAHs	Ram Sadana (416) 235-5861	Patrick Crozier (416) 235-6287
• Characterization of Unknown Contaminants by GC/MS/HRMS	Vince Taguchi (416) 235-5902	Don Robinson/ David Wang (416) 235-6201
• Dioxin/Furan	Eric Reiner (416) 235-5895	Roger Mercer (416) 235-5890/5898
QUALITY MANAGEMENT OFFICE		
• Analytical Methods/Documentation	Cammy Raposo (416) 235-6005	Sathi Selliah (416) 235-5700

ERTF Emergency Response Task Force
PAH Polynuclear Aromatic Hydrocarbons
GC/MS/HRMS Gas Chromatography/Mass Spectrometry/High Resolution Mass Spectrometry

LITIGATION & WASTE ANALYSES SECTION
Telephone: (416) 235-5845
Fax: (416) 235-6113

This section provides analyses of organic and inorganic contaminants in wastewater, sewage, industrial wastes, leachates and landfills. The section is also responsible for the analysis of volatile organic parameters in drinking and surface water of litigation sample analyses through LSB branch, and on-site analytical support for field work and emergencies. Following are the key contact persons for these services.

Contact Point	Contact Person	Alternative Person
Manager	George Kanert (416) 235-5848	
ERTF Representative	Joe Osborne (416) 235-5759	Dave Morse (416) 235-6003
Legal Samples/High Priority Authorization	Rusty Moody (416) 235-6289	Vera Turner (416) 235-5873
Mobile Laboratory	Joe Osborne (416) 235-5759	Dave Morse (416) 235-6003
ORGANIC CONTAMINANTS ANALYSES		
• Industrial/Municipal Effluents, MISA samples (Volatiles & Solvent Extractable)	Yvonne Jones (416) 235-5760	Angelo Alfieri (416) 235-6001
• Spills, Landfills, Wastes, and Groundwater Fuel Contamination	Joe Osborne (416) 235-6286	Dave Morse (416) 235-6003
• Surface, Drinking Water Volatile Organic Contaminants	Walter Offenbacher (416) 235-5908	
INORGANIC CONTAMINANTS ANALYSES		
• Sewage/Industrial Waste/Landfill Leachates	Rusty Moody (416) 235-5863	George Wood (416) 235-6212

ERTF Emergency Response Task Force
VOCs Volatile Organic Contaminants
PCBs Polychlorinated Biphenyls

WATER QUALITY ANALYSES SECTION

Telephone: (416) 235-5870
Fax: (416) 235-6107

This section provides analyses of all major ions, nutrients and physical properties in water (including precipitation, surface water, drinking water, ground water, landfill, sewage and industrial wastes). The section is responsible for the Dorset site which supports the APIOS program in water, precipitation and soil analyses. The section also provides services in LIMS and analytical data integration. Following are the key contact persons for these services.

Contact Point	Contact Person	Alternative Person(s)
Manager	Frank Tomassini (416) 235-5869	Mike Rawlings (416) 235-5880
ERTF Representative	Mike Rawlings (416) 235-5880	Frank Lo (416) 235-5875
LIMS	Frank Guerin (416) 235-5805	Dave Platt (416) 235-6052
		Thomas Ting (416) 235-6074
Analytical Data Integration	Ian Carter (416) 235-6009	John Tymkewycz (416) 235-6070
CHEMISTRY		
• Major Cations/MISA/ Solid Analyses	Jenifer McBride (416) 235-6288	Peter Wilson (416) 235-6094
• Nutrients, Chlorophyll, Colour, Turbidity, COD, Dissolved Carbon, Phenolics, Chloride, Fluoride, Silicates and Cyanide	Mike Rawlings (416) 235-5880	Vince Ferraro (416) 235-5877
• Anions, pH, Alkalinity, Acidity, Conductivity, and BOD Analyses	Frank Lo (416) 235-5875	Bernie Wright (416) 235-5871
DORSET LABORATORY		
• Soil Chemistry	Stu Barnes (705) 766-2412	Jenifer McBride (416) 235-5879
• Water Chemistry	Charlie Chun (705) 766-2412	Jenifer McBride (416) 235-5879

ERTF **Emergency Response Task Force**
APIOS **Acid Precipitation in Ontario Study**

REGIONAL LABORATORIES

LONDON REGIONAL LABORATORY

DEPARTMENT	CONTACT STAFF	PHONE NUMBER
Chief Laboratory Services	Walter Cook	(519) 661-2266
Chemistry Water Quality	Roger Rioux	(519) 661-2240
Chemistry Inorganic	Frank Mo	(519) 661-2267
Chemistry Organic	Dallas Takeuchi	(516) 661-2241
Microbiology	Garry Palmateer	(519) 661-2268
	FAX	(519) 661-1742

THUNDER BAY REGIONAL LABORATORY

DEPARTMENT	CONTACT STAFF	PHONE NUMBER
Manager, Technical Assessment & Laboratory	Bill Creightont	(807) 475-1717
Chemistry, Trace Contaminants	Rick Clara	(807) 475-1769
Chemistry, Water Quality	Shirley Remmen	(807) 475-1770
Microbiology / Administration	Alice Chony	(807) 475-1756
	FAX	(807) 475-1756

KINGSTON REGIONAL LABORATORY

DEPARTMENT	CONTACT STAFF	PHONE NUMBER
Laboratory Supervisor	Dave Ferguson	(613) 549-4000
Chemistry	Jim Howden	(613) 549-4000
Microbiology	Art Ley	(613) 549-4000
General Inquiry	Cathy Grudzien	(613) 549-4000
	FAX	(613) 548-6908

Ontario Ministry of Environment and Energy
Laboratory Services Branch
December 1993

OTHER MINISTRY LABORATORY ACTIVITIES

The Ministry operates a number of laboratory activities managed by sister branches of the Laboratory Services Branch. Following are the key contact persons for these services.

Biomonitoring	**-responsible for algal studies, fish contaminants programs.**
Phytotoxicology	**-responsible for acid rain and greenhouse effects on flora, remote sensing.**
Aquatic Toxicology	**-responsible for aquaculture, toxicity testing, toxicological studies.**

Following are the key contact persons for these services.

Laboratory Activity/ Branch Association Location	Contact Person	Alternative Person
BIOMONITORING SECTION - Manager Environmnetal Monitoring and Reporting Branch @ Laboratory Services Branch FAX: (416) 235-6235	Doug Harper (416) 235-5792	
PHYTOTOXICOLOGY SECTION - Manager Standards Development Branch @ Brampton, Ontario 100 Farmhouse Court L6V 3N2 FAX: (905) 456-1003	Ron Pearson (416) 323-5102	Bill McIlveen (905) 456-2504
AQUATIC TOXICITY SECTION - Manager Standards Development Branch @ Laboratory Services Branch FAX: (416) 235-6091	Gary Westlake (416) 235-5797 (416) 235-5792	

The following addresses should be used when shipping samples to the various laboratories:

a) **LABORATORY SERVICES BRANCH (LSB)**

Ontario Ministry of the Environment and Energy
Laboratory Services Branch
Central Stores
125 Resources Road
Etobicoke, Ontario
M9P 3V6

b) **SOUTHWESTERN REGION - LONDON LABORATORY**

Ontario Ministry of the Environment and Energy
Southwestern Regional Laboratory
985 Adelaide Street South
London, Ontario
N6E 1V3

c) **NORTHERN REGION - THUNDER BAY LABORATORY**

Ontario Ministry of the Environment and Energy
Thunder Bay Regional Laboratory
421 James Street South
Thunder Bay, Ontario
P7E 2V6

d) **SOUTHEASTERN REGION - KINGSTON LABORATORY**

Ontario Ministry of the Environment and Energy
Southeastern Regional Laboratory
133 Dalton Avenue
Kingston, Ontario
K7L 4X6

Further enquiries regarding container requisitions, shipping, etc., should be directed to Central Stores at Laboratory Services Branch (Telephone: (416) 235-5739).